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The Look of the Thing

INDIFFERENCE is a dangerous vice—when extended to health it can be particularly so. For far too long we have accepted in our food the fruits of two separate—but closely related—attitudes of unconcern, to which recent suggested changes in legislation, and the comments of medical authorities, have only now drawn attention.

Sir Edward Mellanby, commenting some four years ago on the increased incidence during the last half-century of certain morbid conditions, wrote that it was 'difficult to avoid the conclusion that some at least of these increases in disease are due to errors in living recently introduced or greatly expanded in modern times', and concluded that 'it may be that one of these errors is the ingestion of food treated by unnatural chemical substances' (*BMJ*, 1951 [2], 863). This cause, he considered, 'might well be considered whenever a disease commonly found in countries which use these methods has resisted all efforts of the investigator to find a satisfactory aetiological basis'.

Apart from the relatively limited requirements of confectionery, there is little justification for the addition of 'unnatural chemical substances' to food, and their use almost invariably serves to conceal deficiency of ingredients such as eggs, butter, chocolate or fruit, or deterioration in quality during manufacture. Strawberry jam is an excellent example. Boiled in bulk, in copper pans, perhaps from inferior fruit, it loses much of its colour—and that loss of colour indicates surely the loss of a great part of its nutritive value. It is therefore dyed a vivid scarlet. This scarlet is quite unlike the colour of strawberries, and even more unlike that of strawberry jam, yet the manufacturers maintain that the public will not buy jam which is not so dyed.

Many other examples come too readily to mind: the addition of a yellow dye to margarine, solely because we, the weak-minded public, prefer to pretend that we are eating butter, rather than admit that we are eating a white, but cheaper, substitute; the colouring of kippers, no longer smoked over oak chips; and the use of Agene, because it is no longer considered economic to age flour naturally.

The case of Agene is, in fact, a particularly critical example, since it is only a month ago that the Minister of Food announced that the use of this chemical would cease after 31 December 1955. This is no less than eight years after Sir Edward Mellanby showed that Agenised bread gave rise to hysteria and other toxic symptoms in dogs, and five years after the Ministries of Food and Health had concluded that the improving of flour by this method should be discontinued.

Our legislators generally appear to trust blindly, whatever the circumstances, to the principles of British justice: they hold a substance to be innocent of toxic properties until it has been proved otherwise. Many committees have reported, as did the Working Party on Toxic Chemicals in Agriculture and Residues in Foods (THE CHEMICAL AGE, 1953, **68**, 792) that they were 'unable' to discover any specific instances of illness which have resulted' (as a result of eating food exposed to a toxic chemical) and that therefore 'the position does not appear to have been established as one of

immediate danger'. This is wellnigh criminal; no substance which may be a potential danger to health should be employed at all until it has been proved beyond doubt harmless.

Yet another example of this nonchalant attitude towards our food is revealed in the recent report of the Preservatives Sub-Committee of the Food Standards Committee on colouring matters (THE CHEMICAL AGE, 1955, **72**, 176). The usual puerile protests were put forward by certain trade associations: that no complaints of illness due to the consumption of foods containing added colour have been received; that a large variety of colours is required in the UK food industry, and the present system gives the necessary freedom of choice to the manufacturer; and that although certain coal-tar colours have been shown to have an adverse effect on experimental animals it does not follow that human beings would be similarly affected.

The very serious condition which has been allowed to develop with regard to foodstuff coloration is shown rather obliquely in the report. As matters stand at the moment, and have stood for the last 30 years, any colours may be added to food (except milk), other than compounds of antimony, arsenic, cadmium, chromium, copper, lead, mercury and zinc; gamboge; and five 'coal-tar' colours, picric acid, Victoria yellow, aurine, Manchester yellow and aurantia. Even the notorious 'butter yellow', *p*-dimethylamino-azo-benzene, is not among the forbidden colours, although we hope that no manufacturer is so criminally irresponsible as to continue using it. Nevertheless, the report reveals that no less than 10-15 per cent of the margarine in this country is still coloured with coal-tar dyes, although the oil-soluble dyes which must be used for this purpose are perhaps the most suspect of carcinogenic activity. In fact, of the oil-soluble yellow colours investigated, only one was considered reasonably harmless, and doubts were expressed about its stability in the presence of alkali.

The medical members of the sub-committee examined the evidence which had been recorded for or against a total of 79 colours which were proposed by various trade associations. They say: 'We have found the whole subject of food colours so clouded with uncertainty . . . that, with the safeguarding of the public health as our dominant consideration, we feel that . . . the number permitted should be limited as far as possible.' The colours were divided into three categories: those which had so far not shown any toxic effects and which seemed from their structure and physico-chemical properties unlikely to be harmful in ordinary amounts; those for which there was no direct evidence of toxicity, but about which the evidence was inadequate or conflicting; and those shown or suspected to be harmful. Principal concern of the investigators was with carcinogenicity, but other toxic effects were also considered.

Twelve colours qualified for the first category, 32 for the second, and 35 were rejected. A 'short list' of 32 was finally drawn up, to which were added 12 'natural' colours. The following figures are of considerable interest. Of 35 colours put forward by the ABCM, 11 came in the first category, 17 in the second, and only 7 were rejected. The British Baking Industries Association submitted 39 (11 + 18 + 10), the British Essence Manufacturers' Association & Flavouring Compound Manufacturers' Association 64 (12 + 28 + 22), and the Cocoa, Chocolate & Confectionery Alliance 62 (12+23+27). No comment.

One of the recommendations of the sub-committee on colours appears to leave open an unnecessary loophole. They conclude 'that in general notification of the presence in foods of added colour should be given to the purchaser. Exceptions to this general requirement may, however, prove necessary'. There can exist no reason for exceptions to this requirement; indeed, the law should require a manufacturer to name all the substances which he has added during the preparation of the food. If he has nothing to hide, he will willingly admit the additions; if there is something concealed, the law should not allow him the expedient of an exception to the rule. We, the public, demanding titivation of our food for the titillation of our appetites, should at least be taken into the confidence of those who satisfy our demands.

Notes & Comments

Who Will Teach?

THE recruitment of science teachers for our schools shows not the slightest sign of improvement despite the greater public attention drawn to the problem in 1954. Much is said, little done—an old English custom where social problems are concerned. An astonishing article in the *Sunday Times* of 23 January by Mr. H. A. Ree, Headmaster of Watford Grammar School, suggests that the principal reason that recruitment is low is that 'scientists don't like people.' This anti-social attitude attributed to scientists is stated by Mr. Ree as a general rule, though he concedes the existence of exceptions. He also puts up a subsidiary theory that 'people tend not to like scientists' which also discourages recruitment. Those of us who are not schoolteachers—and many who are chemists today are people who once decided not to teach—may not appreciate to its fullest extent this humanistic impulse behind the schoolroom career, but to suggest that a scientific training significantly dehydrates young men so that they cannot respond to such impulses is a poor piece of observation. Mr. Ree might well reflect upon another aspect of his hypothesis, that one reason why scientists reject teaching as a career is the far from unfounded suspicion that headmasters and other persons of influence in that profession tend not to like their scientific colleagues, or at any rate to cherish prejudices about the effects of scientific training upon humanity. This, of course, is not without influence upon the mechanism of preferment that decides where the professional plums are distributed.

A Dangerous Contribution

IF Mr. Ree wants to delve more deeply into his odd thesis that scientists don't like people and also into its inverted form that people tend to dislike scientists, he must surely study scientists, especially younger men, in the working environments that they prefer to choose today, in industry and in research establishments. His sample will then be large enough to be the basis of a fair assessment. He will find that the general rule is much the same as for any other classification of people, that the ratio of warmth or coldness in reactions with others is normal. Indeed, in industry scientists often have to solve complex problems of human interaction and by persuasion rather than by professional authority. Mr. Ree's argument that scientists would enjoy a teaching career if they liked people more is a dangerous contribution to this grave problem of our time. It is not enough to admit that the pay is poor and then to paint a rosy picture of happiness and fulfilment in a grossly under-rewarded service. Does it mean that young scientists do not like people enough when they reflect that their future wives and their own children will be far less well provided for if they teach instead of entering industry or research? Young scientists are rejecting teaching today because they are in fact extremely human—and sensibly so. Every attempt to evade this issue prolongs the period of science teacher scarcity and deepens a national crisis with the most serious long-term consequences.

Old Evergreen

CHEMICAL Research Laboratory had to admit that they were as amused as we were at one of their latest discoveries, shown last week at the conversazione of the Corrosion Group of the SCI. Chlorophyll, it seems, is coming into the news again; impregnated in tissue paper, it will protect copper and silver articles from tarnishing. No claims are being made *yet*, say CRL, but the discovery forms part of a patent application. A number of different reagents were tested, other successful ones being copper chromate and phosphate, and lead chromate and nitrite. Tissue paper was treated with 5 per cent solutions, and the mode of action of the reagents differs completely from that of vapour phase inhibitors, being an actual chemical

'mopping-up' of hydrogen sulphide. Articles wrapped in the tissue were exposed to a volume of one litre of an atmosphere containing about 1 part in 250 of H_2S; they remained untarnished. This concentration is about 80,000 times that found in the usual industrial atmosphere, and the discovery should prove a useful one. It may prove particularly so to those manufacturers who went into chlorophyll production on a large scale some time ago on the strength of the deodorant claims, and who are now left with a capacity many times greater than the demand.

Tanning Agents from Lignin?

AT THE Ontario Research Foundation, promising advances are being made converting lignin into a tanning agent. For Canada, such a development would have a dual value. At present 99 per cent of the tannins used in her leather production are imported. She has vast wastes of lignin from her wood pulp industry. It is already known that waste sulphite liquor from coniferous woods can be used as a diluent for vegetable tannins—5 or 10 per cent additions dilute without weakening the tanning property. Used alone, however, sulphite liquor is an unsuccessful tanning agent. As fundamental knowledge about tannins and their effects upon hides and skins is still meagre, there is no firm guidance to show why lignin chemicals can help in tanning or why they fail when used alone. A plausible guess was made that the weakness of sulphite liquor was its low ratio of phenolic hydroxyl groups; for it is believed that the tanning properties of established vegetable agents are associated with these groups.

Phenol Condensation Process

CHLORINATION was first tried as a means of increasing the phenolic hydroxyl content of lignin sulphonates. This succeeded, and the tanning capacity of lignin sulphonate samples improved roughly in proportion with their increased phenolic hydroxyl group content. Even so, the final products were still much inferior to vegetable tannins, and the cost of the chemical treatment was too high to be justified. Direct condensation with phenol was then attempted, and it was found much easier than had been expected to achieve a phenol/waste liquor reaction, using ion exchange to remove cations from the liquor and subsequently condensing with phenol under pressure in aqueous solution. Once again, it was found that tanning properties increased in proportion to the amount of phenol introduced. The final materials from this second process could be mixed with vegetable tannins to a 50 per cent extent without reducing tanning quality. It is believed that the phenol condensation process will have economic possibilities.

Further Developments Possible

A THIRD variation has since been studied, using dihydric phenols such as resorcinol and catechol; condensation products from these have had tanning properties comparable to those of the vegetable tannins. However, the cost of production seems too high to make them competitive. Also, the use of waste cresol material from refineries as a source of phenolic hydroxyl groups has been tried out, and the material obtained was equivalent to commercial tanning blends now used for re-tanning upper leathers. This last venture might well achieve development for it utilises two waste materials to give a serviceable product. For a fuller description of these nursery-stage research projects, see *Canadian Chemical Processing* (1954, **38**, [12], 92).

PVA from BOC

THE Chemicals Division of the British Oxygen Company has recently completed a new plant at Chester-le-Street for the manufacture of polyvinyl acetate. The plant is semi-automatic, and the only one in Great Britain capable of producing PVA from the basic raw materials, it is claimed. For the first time therefore manufacturers of emulsion paints and of other products using PVA have available to them this essential ingredient, prepared and standardised throughout entirely under British control. Further details of the new plant will be published in our issue of 5 February.

Wilton Terylene Plant

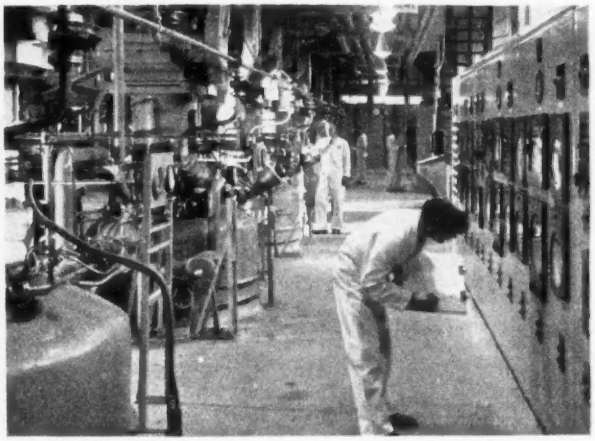
AN event of considerable importance—long- and eagerly-awaited—took place recently at the Wilton Division of Imperial Chemical Industries Ltd. This was the commissioning of the first large-scale plant for the production of the first all-British synthetic fibre, Terylene, and on 19 January a large party of journalists travelled to North Yorkshire to see the plant in operation. Hitherto Terylene has been produced only through pilot plant operations at Huddersfield and Hillhouse (Fleetwood) but the Wilton plant is capable of producing 5,000 tons now and by 1956 output will be doubled.

Terylene, a polymeric ester obtained by condensing terephthalic acid with ethylene glycol, was discovered by Mr. J. R. Whinfield, C.B.E., and Dr. J. T. Dickson, of the Calico Printers' Association, at Accrington in 1941. Its origins, however, may be found in the research work carried out by W. H. Carothers during the period 1927-37, for it was he who first demonstrated the drawing of linear polymers into fibres and put forward the basic theory and support for polycrystallinity. Whinfield took up the study of polyesters, which Carothers had dropped because of their low melting point, and decided to study the effects of symmetry such as exists in aromatic polyesters, using the isomeric benzene dicarboxylic acids as components. Whinfield was the first to establish that symmetry has a most profound effect upon polymer properties. He discovered that polyethylene terephthalate, unlike the *o*- and *m*-isomers, had a high melting point (246° C), was polycrystalline and could be drawn into strong fibres showing unusual resistance to hydrolytic attack.

The Ministry of Supply declared the Terylene patents secret and work on the invention was passed to the Chemical Research Laboratory of the Department of Scientific and Industrial Research.

Towards the end of 1943, I.C.I. was approached by the Calico Printers' Association and asked to help in the development of the fibre, for there were several practical problems which remained to be solved. In January 1944 the first Terylene yarn made by I.C.I. was produced from a small amount of polymer obtained from DSIR. This yarn showed promise and further small-scale work was undertaken.

Early in 1947 I.C.I. acquired the world rights to manufacture Terylene, except in the US, where the rights had already been acquired by E. I. Du Pont de Nemours & Co. By the spring of the same year I.C.I. had built experimental plants and were ready to make the polymer and spin filament yarn on a small scale. By the end of 1949 a pioneer polymer plant and a pioneer spinning plant had been built at Huddersfield and at Hillhouse respectively. These plants



The autoclave floor in the polymer building where polymerisation of dihydroxyethyl terephthalate takes place at high temperature and very high vacuum

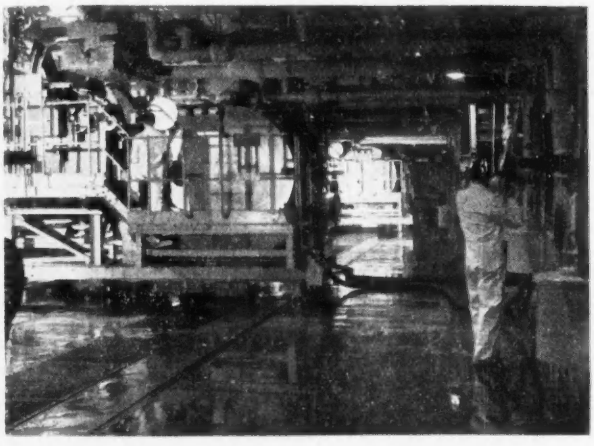
are currently producing at the rate of approximately 900 tons per year. The capacity of the first unit of the Wilton plant will be roughly 5,000 tons per year, divided equally between filament yarn and staple fibre. When the second unit of the plant comes into operation in a few months time the capacity will be doubled.

The principle raw materials of the Terylene plant are *p*-xylene, ethylene glycol and methanol. All of these are products of I.C.I.'s Billingham Division and the first two are made at Wilton.

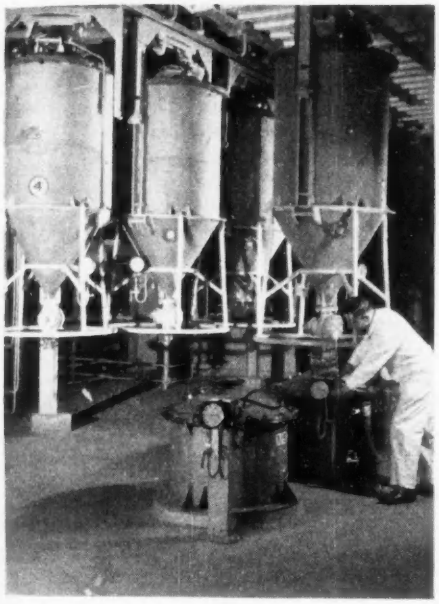
In the first chemical building of the Terylene plant *p*-xylene is oxidised to terephthalic acid. In the second building this is processed with methanol to form dimethyl terephthalate (DMT) which is then purified. In the third, or polymer, building, the DMT is reacted with ethylene glycol to give dihydroxyethyl terephthalate, which is then polymerised in autoclaves at high vacuum and at high temperatures. The result is polyethylene terephthalate or Terylene polymer.

The polymer is extruded in the form of a ribbon from the autoclave on to a casting wheel where it solidifies. It is then cut into chips for easy handling and conveyed by suction to the spinning building.

Fundamental differences exist in the preparation of polyamides and polyesters owing to their inherent chemical nature. With nylon, equilibrium conditions favour the formation of amide groups, and amide interchange is slow. The essential stoichiometric balance is obtained by polymerisation of hexamethylenediammonium adipate. In the case of polyethylene terephthalate there is no simple method of achieving an exact balance, except by careful weighing. Equi-



The machines for casting polyethylene terephthalate and the dicing machines which cut the ribbon of polymer into chips for easier handling



The polymer chip hoppers over the spinning machines. The chips have been dried and will be melted before passing down to the spinning machines

librium is decidedly unfavourable, and ester interchange is rapid, resulting immediately in lack of reactant balance and limitation in molecular weight. In practice high polymers are produced by using an excess of glycol, which produces a glycol ester by complete esterification. This is then built up to a polymer by a process of ester interchange and elimination of glycol, approaching gradually the desired equimolar balance.

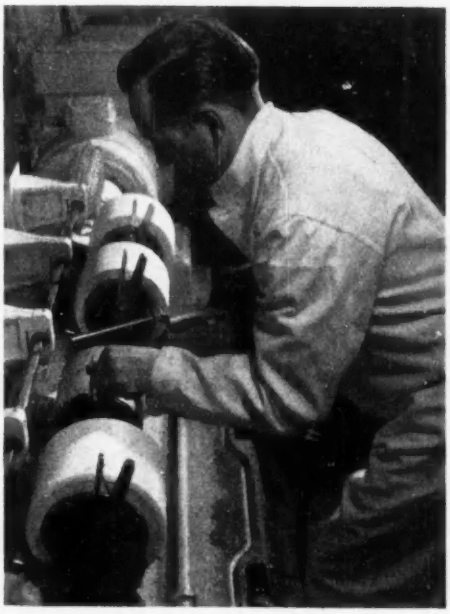
Terephthalic acid has never been in common use and I.C.I. found it necessary to develop an economic process for its production. *p*-Xylene was selected as an abundant and cheap raw material as it was available from the company's oil cracking activities. It is very difficult to separate economically by distillation from its isomers, but advantage has been taken of the fact that it can be obtained by fractional crystallisation. *p*-Xylene can then be oxidised with moderately dilute nitric acid to crude terephthalic acid. As this is insoluble and relatively inert, it is purified through the dimethyl ester, which can be readily distilled and crystallised. The dimethyl terephthalate then undergoes ester interchange with ethylene glycol.

In all the chemical processes an extremely high standard of purity, exceeding that of many pharmaceuticals, is maintained. Great emphasis is placed on testing at every stage and practically all of the equipment in the second chemical and polymer buildings is of stainless steel to ensure absolute cleanliness.

Each batch of polymer chips is collected in a portable hopper and samples from each are analysed before the batches are blended together and emptied into bunkers for conveying to the spinning building.

For filament yarn production the chips are dried before melting. The molten polymer is extruded at high pressure through the holes of a spinneret and the individual filaments solidify, are drawn together and wound on to cylinders. It is then taken to draw-twist machines where it is stretched to roughly four times its original length and wound on bobbins. Twisted or 'thrown' yarn is heat stabilised and wound on cones.

For staple fibre production the chips are also dried but the extrusion of filaments takes place on a much larger scale and the filaments are brought together to form a thick tow. This tow is drawn, crimped



The undrawn yarn as it comes from the spinneret being wound-up on to cylinders. The operator is using a suction gun as he puts on a fresh cylinder

mechanically and the crimp stabilised by heating. The tow is cut into specified lengths and baled.

Throughout the entire plant, from the first chemical building to the packing department, pharmaceutical standards of cleanliness are maintained. Each stage in the process includes testing and/or analysis and samples are drawn regularly throughout the plant for complete analysis and testing. Washing-facilities are conveniently situated and workpeople look more like hospital attendants than chemical or textile workers.

Wilton is the largest single project in the British chemical industry and with nearby Billingham forms one of the greatest (probably the greatest) concentrations of chemical industry in the world. It occupies an area of 2,000 acres and £40,000,000 has been spent since 1943 on its development. Expenditure goes on at the rate of £750,000 per month and it is suggested that in the next 10 years expenditure on the site will have reached £100,000,000.

Wilton is not a factory belonging to any one Division of I.C.I. but it is a centre where any division can build and operate plants, drawing on common services like steam, electricity and water together with certain administrative services. At present there are a dozen plants belonging to six I.C.I. Divisions in operation while two are building and others are being designed. I.C.I.'s oil cracking plant is located at Wilton and it supplies ethylene for plants making polythene, ethylene glycol and the detergent Lissapol N, as well as a number of other materials which are pumped to Billingham. Less than a year ago it was announced that a second oil cracker and a butadiene plant were to be built and soon after it was stated that a plant was to be set up to make butadiene co-polymers.

Work on the foundations of the Terylene plant, which covers and area of 30 acres, began in May 1952. The main civil contractors were A. Monk & Co. Ltd., of Padgate, Lancs.

Letter to Borax

THE American group which made an offer to obtain control of Borax Consolidated Ltd. are now considering what action they should take as a result of the board's refusal of their offer.

This is stated in a letter to the chairman of Borax from Robert Benson, Lonsdale & Co. Ltd., who are acting on behalf of the group. The letter points out that the price of £5 per stock unit offered when negotiations began in September was a minimum figure 'in the light of the very meagre official information then available to stockholders.' On the basis of the interim profit statement published in December, the group were considering an increase in the purchase price.

The Treasury, says the letter, would have had ample opportunity to determine whether the acquisition for US dollars by the American group of mining properties primarily located in the United States is consistent with the national interest of this country. The group for its part had undertaken to make 'such commitments and conclude such agreements as might be necessary to protect the national interest.'

'Had Treasury consent been granted, the directors and the stockholders could have decided whether the final price then offered by the American group for the deferred ordinary stock was satisfactory, taking future prospects into account,' the letter goes on. 'Your directors have taken it on themselves to decide a question of national interest instead of leaving it to the Treasury, and their circular letter suggests that they would not recommend the acceptance of any offer for the company's stock regardless of price.'

Microchemistry in Vienna

ORGANISED by the Association of Austrian Chemists and the Austrian Society of Microchemistry, a Microchemical Meeting will be held in Vienna from 12 to 17 July. As the meeting is to cover all branches of microchemistry, it is intended to include spectrochemistry. During the meeting there will be conferences of the Commission for Microchemical Techniques and of the IUPAC Subcommission for the Standardisation of Microchemical Apparatus. Immediately before the meeting there will be a general assembly of the Association of Austrian Chemists, and the general assembly of the Austrian Society of Microchemistry will be held during the course of the meeting. From 12 July to 16 July there will be an exhibition of microchemical apparatus at the University. Social events have been arranged, and a programme for ladies planned.

Sulphur All Over the World

Prospects Good for Next 10 Years

SURVEY of world sulphur supplies is the principal article in the latest Quarterly Bulletin of the Sulphur Exploration Syndicate, soon to become the British Sulphur Corporation Ltd. (see THE CHEMICAL AGE, 1955, **72**, 295). This examines the trend of developments over the next 10-12 years.

Based on the present-day price of Frasch sulphur it appears probable that during this period the decline of United States land-based Frasch sulphur production will at best be made good by increasing production in Mexico. The anticipated increase of world requirements between 1956-1965 of about 4,200,000 tons of sulphur in all forms is expected to have to be met from sources other than Frasch sulphur. Recovery from natural sour gas and the application of modern refining processes to native sulphur ores are likely to provide the major proportion of additional requirements, while an increasingly important contribution may be expected from sulphur recovery from industrial gases—which may be pursued beyond its economic limits in the light of air pollution and strategic considerations.

The availability of ample low-cost elemental sulphur supplies in the immediate future may reverse the trend of the increased pyrites use of recent years, and this may hasten the development of economic means of dissociating sulphur and metal values in pyritic ores. With adequate investment and economic stability in the potential producing countries, a major increase in the price level of sulphur may be avoided.

Commonwealth Reviews

The Commonwealth territories reviewed in this issue are the Central African Federation and British East Africa. In the great and varied mineral wealth of these territories deposits of sulphurous raw materials are lacking. The North Rhodesian copper belt provides the most significant source, where sulphurous stack gases result from the smelting of copper and zinc. Only a fraction is at present recovered in the form of acid and the bulk of the potentially recoverable sulphur content of over 150,000 tons per annum will continue to be exhausted to the atmosphere, pending the growth of consumer industries which would warrant greater utilisation.

The sulphur industry of Portugal is based on rich pyrites deposits which have been exploited for nearly 100 years, providing, in this time, over 10,000,000 tons of sulphur in pyrites, of which about 85 per cent has been supplied to the acid industries of Western Europe and North Africa. The annual productive capacity of the various mines is estimated to total 400,000 tons of sulphur in pyrites. The promising results of recent geophysical surveys may lead to increased production, which, as the result of Government export controls aimed at preserving reserves for anticipated domestic needs, had in the past two years been cut back to about 300,000 tons of sulphur in pyrites.

Present-day domestic requirements total about 95,000 tons of sulphur, including about 20,000 tons in an elemental form, most of which results from the treatment of pyrites by the Orkla process at the San Domingos mine of Mason & Barry Ltd. The expected expansion of sulphur use, notably for fertiliser manufacture, may, it is thought in some quarters, double domestic requirements in the next five years.

US Production & Demand

In the US, production during the third quarter of native and recovered sulphur totalled 1,462,736 tons, and production during the first 9 months of 1954—over 4,380,000 tons—was the highest on record, exceeding that of the corresponding period of 1953 by more than 5 per cent. Low domestic demand, which only started to improve towards the end of the third quarter, was more than compensated by high exports, and apparent sales totalled 1,465,085 tons. Apparent sales for the first 9 months of nearly 4,190,000 tons exceeded those for the same period in 1953 by about 0.75 per cent mainly on account of the highest export total on record of 1,200,000 tons.

In the sulphur industry in Italy the critical situation persists. As the result of an increase in subsidised production, and the inability to export, the country's stocks are reported to exceed 300,000 tons. Industry is looking to the Government, whose attitude

concerning the future level of production, prices and the disposal of accumulated stocks may be made public in January, when the presentation of appropriate bills in the Italian House of Representatives is expected.

In the UK consumption of sulphur in all forms during the third quarter amounted to about 201,000 tons, about 11 per cent more than during the corresponding quarter of 1953. Elemental sulphur consumption totalled 88,800 tons, 2½ per cent less than during the second quarter, but owing to apparently greater reductions in the use of other raw materials for acid making, the proportion of brimstone acid rose 0.75 per cent to 35.75 per cent. Acid output totalled 489,600 tons, 8.75 per cent more than during the corresponding period of 1953.

UK Consumption Varied

After continuing to decline seasonally in July and August, acid consumption in September was the second highest monthly total on record; compared with the corresponding period in 1953, acid consumption during the third quarter 1954, amounting to 488,500 tons, was 6.5 per cent greater, with most consumer industries showing increased requirements. The only major decrease was recorded in the use for superphosphate manufacture. The progressive expansion of acid requirements may temporarily continue to strengthen the position of brimstone as a raw material for acid making. The full impact of new anhydrite acid supplies in the autumn is likely to reverse this trend.

A review of the three new anhydrite acid projects summarises the progress to date of this important section of the UK acid industry, which in the autumn of 1955 is expected to contribute at the annual rate of 300,000 tons to the acid requirements of the country, and which, together with the existing plant at Billingham, may then account for 19 per cent of UK acid supplies.

The refining process developed by Scientific Design Company of New York, from the earlier Nagelvoort process, is described. It is based on the use of carbon disulphide as a solvent, and in this field it is believed to be, at present, the only 'continuous' process. It is stated to be suitable for ores with a sulphur content as low as 10 per cent and to give high recovery at costs permitting this form of sulphur production to compete with Frasch sulphur.

World prices of sulphur have continued stable although the steep rise of sea freights in recent months has caused an increase in consumers' costs which, in the UK and Western Europe, is estimated to be in the region of 6-7 per cent. The record level of elemental sulphur production in the US in 1954, estimated at 5,800,000 tons, more than satisfied all export demands (which exceeded 1,500,000 tons, the highest on record) as well as domestic needs which, as the result of the quickening of the US economy during the autumn, showed an increase on earlier months of the year.

Chilean suppliers, in spite of low prices, are having difficulties in finding markets. The available Frasch sulphur production in the US and Mexico is likely to exceed world demand in 1955, more so as world supplies of recovered sulphur show a further improvement and increased tonnages of low cost native sulphur may also seek markets. Competitive supplies available to expanding markets, notably as regards 'regular' sulphur needs, promise to make 1955 a satisfactory year. By courtesy of the Freeport Sulphur Company, their Survey of Free World Sulphur Supplies in 1953 is included in the Bulletin.

Carbon Black Complaints

AT the meeting on 10 January of Ellesmere Port Council's General Purposes Committee it was disclosed that four letters and a petition signed by 200 people had been received complaining of soot from the Cabot Carbon plant. The council recently sanctioned work on a new unit at the factory after delegates had flown to Canada at the company's expense and inspected the firm's premises at Sarnia.

Mr. E. Tuft (chief sanitary inspector), said that delay in the company receiving some raw materials meant them drawing on some supplies at a lower level. There was a minor explosion and material was pushed out into the atmosphere.

Mr. C. W. Davies (surveyor) read a letter from a director of the parent company in America assuring the council that the new unit would operate so as to achieve a high standard of cleanliness. The committee decided to ask for a report from the chief sanitary inspector at the end of March, so as to give the company an opportunity to carry out their promise.

The Export Situation

Record Month Ends Record Year

CHEMICAL exports from the United Kingdom reached a record value of £203,840,892 in 1954. The previous highest figure was £192,932,000 in 1951, since when the value had been steadily dropping, partly because prices were lower.

At the same time, imports increased last year to a value of £101,613,000, almost half the export figure. This is still less than the 1951 import figure of £112,000,000.

December saw a welcome revival in export business, after the lean months of October and November when trade was affected by the London dock strike. The total value of £21,720,714 was the highest for any month in the year, and in general the increase affected all commodities.

There were one or two exceptions to this rule. Fertilisers, for example, showed a decline, but this could be attributed to the time of the year and the figures, which had increased during November, were well above those of December, 1953. One or two chemical compounds decreased by small amounts.

Business with most countries outside Europe improved considerably, and the fall in exports to Canada was balanced by a large increase to the USA. Increased trade was also done with the Argentine and Egypt, and the figures for Indonesia suddenly went up by over 4,000 per cent.

TABLE 1

Value of Exports in £: Principal Customers

	Dec. 1954	Nov. 1954	Dec. 1953
Gold Coast	443,203	189,913	301,881
Nigeria	429,797	233,487	325,546
South Africa	947,444	555,496	911,390
India	1,597,414	976,288	981,112
Pakistan	626,354	234,535	442,964
Singapore	395,441	231,275	319,119
Malaya	347,697	163,400	241,146
Ceylon	332,889	237,983	254,521
Hong Kong	356,383	208,587	323,251
Australia	1,978,351	865,240	1,398,741
New Zealand	582,032	388,621	373,258
Canada	629,012	846,774	372,428
Eire	520,065	542,359	510,914
Finland	248,456	126,414	112,227
Sweden	558,929	505,775	530,459
Norway	290,909	265,813	320,635
Denmark	352,361	339,945	289,468
Western Germany	385,847	493,463	321,765
Netherlands	635,478	701,767	609,146
Belgium	361,493	418,896	304,308
France	688,122	517,166	367,366
Switzerland	190,354	227,455	163,928
Portugal	200,069	106,324	104,349
Italy	535,413	445,227	281,736
Egypt	355,584	163,907	241,878
Indonesia	424,897	9,321	111,170
US	747,085	401,005	873,676
Argentine	1,401,526	520,940	648,244
Total value of chemical exports	**21,720,714**	**14,360,856**	**15,864,858**

TABLE 2

Value of Exports in £: Principal Commodities

	Dec. 1954	Nov. 1954	Dec. 1953
Acids, inorganic	48,129	42,371	72,665
Copper sulphate	90,196	132,005	58,189
Sodium hydroxide	578,908	199,569	422,658
Sodium carbonate	151,899	137,776	107,416
Aluminium sulphate	30,865	30,062	22,429
Ammonia	45,332	18,171	30,357
Ammonium chloride	42,406	24,623	33,035
Bismuth compounds	37,543	20,127	36,585
Bleaching powder	45,436	35,440	33,035
Hydrosulphite	85,267	47,063	30,855
Calcium compounds, inorganic	49,821	39,262	85,052
Lead compounds, inorganic	38,572	38,999	35,748
Magnesium compounds	70,038	49,852	73,470
Nickel salts	44,683	47,526	53,446
Ethyl, methyl, etc. alcohols	131,332	125,541	160,062
Acetone	45,127	40,731	107,294
Lead tetra-ethyl	644,208	508,789	146,328
Total for chemical elements and compounds	**5,280,369**	**3,738,297**	**4,455,810**
Coal tar	73,870	92,162	100,962
Cresylic acid	88,667	31,843	71,208
Creosote oil	221,220	69,461	197,308
Total from coal tar, etc.	**440,950**	**213,127**	**531,248**
Indigo, synthetic	118,147	35,238	99,928
Total for synthetic dyestuffs	**1,674,510**	**568,644**	**890,247**
Total from paints, pigments and tannins	**1,893,731**	**1,288,158**	**1,519,879**
Medicinal and pharmaceutical products, total	**3,465,090**	**2,365,990**	**2,750,556**
Essential oils : Natural	53,234	33,745	51,531
Synthetic	124,017	50,017	62,308
Flavouring essences, etc.	100,598	74,293	84,592
Total for essential oils, perfumes, etc.	**2,273,401**	**1,459,682**	**1,596,269**
Ammonium nitrate	29,557	18,620	59,626
Ammonium sulphate	754,334	833,903	371,119
Total for all fertilisers	**863,631**	**892,071**	**484,532**
Plastics materials, total	**2,527,242**	**1,773,559**	**1,969,337**

Handling Rocket Fuels

Compoflex Produce the Hose

ROCKET research has been under intensive development for several years in this country, although the precautions of the Ministry of Supply have prevented the release of much news on the subject. A corner of the security curtain was lifted for a short time on 19 January, when Government and industrial scientists and representatives of the Press attended a private exhibition staged by the Compoflex Co. Ltd., at their Flexible Advisory Centre, 26 Grosvenor Gardens, London S.W.1.

Essential as a propellant oxidant for rocket engines and guided missiles (and also for torpedoes and submarines) is high-test peroxide, or HTP—hydrogen peroxide of a concentration greater than 75 per cent. Handling this material under pressure presents many problems: peroxide is of course unstable, although in the purities nowadays obtainable its rate of decomposition is very low except in the presence of catalysts. Among these catalysts are metals which might be employed for rigid tubing. If, on the other hand, flexible tubing is employed, kinking of the tube could trap small quantities of peroxide, which would subsequently decompose. Moreover, the vigorous oxidising properties of peroxide make many organic materials unsuitable for use in flexible tubing.

These difficulties have been overcome by Compoflex, and they have now produced a range of thin-walled flexible hoses, all compatible with HTP, some of which have been in operational use for two years or more. Also developed for use with the hose are O-rings and special non-creep gaskets.

Previous HTP hoses were made entirely of Molene, a specially-compounded PVC, but they did not prove very satisfactory in service due to lack of flexibility at low temperatures, liability to kink and collapse, and a relatively short life. The new hoses are of Molene supported on Terylene, and they are available in sizes from 1 to 3 in. ID.

Three types are at present in course of production. The first is wire supported: the hose is a layer of Molene PVC, covered with a layer of Terylene coated on both sides with PVC; over this is wound a stainless steel spiral covered with one layer of PVC and two layers of PVC-coated Terylene. The layers are then carefully bonded to give a light-weight, smooth-bore flexible. The integral wire spiral will allow the hose to support the weight of a man without damage, and gives a test pressure of 200 psi.

After the wire-supported hose had been successfully tested, Compoflex were asked to design a collapsible, ultra-light hose which could be wound on a reel. The problem of preventing the trapping of small quantities of HTP was overcome by producing a hose consisting of a layer of Molene PVC between two layers of PVC-Terylene; during manufacture a spiral channel is formed in the bore lining. This rifling prevents the build-up of gaseous products, since no matter how the hose is kinked an escape passage is always provided along the entire length. The hose has a weight of 0.25 lb. per ft., and a test pressure of 150 psi.

High pressure hose uses the medium pressure hose with an additional overall braiding of stainless steel. The first of the range is a $\frac{3}{4}$ in. ID hose with a working pressure of 800 psi. The company are also manufacturing hose in polytetrafluoroethylene, which will withstand almost everything except liquid sodium and fluorine.

IN THE EDITOR'S POST

Manchester's First

SIR,—I would like to support the letter from Mr. N. McKinnon Wood in your issue of 15 January (page 240) regarding certain statements made in a previous issue (1 January) on the opening of a Manchester branch by a London firm of laboratory suppliers.

Our London friends would appear to claim to be the first complete laboratory furnishers with showrooms in Manchester! I am sure it is well known that there are several long established firms who have been supplying the needs of science in the Manchester area for a great many years.

In the case of my own firm, our Manchester branch was formerly Fredk. Jackson & Co. Ltd., which firm was originally established in 1790. In fact, I believe that we still have salmon fishing rights in the River Irwell, though these, alas, are no longer profitable.

Yours faithfully,

J. S. TOWERS.

Managing Director,
J. W. Towers & Co. Ltd.

The New Industrial Revolution

Electronic Control the Key

SPEAKING at the annual luncheon of the British Industrial Measuring and Control Apparatus Manufacturers' Association (BIMCAM) at Londonderry House, London, on 18 January, Sir Roger Duncalfe, president of the British Standards Institution, predicted an industrial revolution greater than the world has yet seen.

Earlier, Sir Edward Boyle, MP, Parliamentary Secretary to the Ministry of Supply, had stressed the great importance of BIMCAM's work for the small firm as well as the large, and referred to the shortage of control engineers which his Ministry, with the Ministry of Education, was trying to put right.

Sir Roger Duncalfe, who is also vice-president of the Federation of British Industries, said: 'If I were to change my industry, I should choose yours. And why? Because in this science of measurement, which is as old as history, we are moving at an ever-increasing pace. The stage now under development is moving forward from the automatic control of the individual operation to the automatic linking of a series of these controlled operations to a master electronic device controlling the movement of material from one process to the next with an accuracy of prediction and a delicacy of adjustment exceeding anything human control or judgment could achieve.

'The social and economic implication of the completely automatic factory and of public services such as transport, power production, public heating and lighting—and it may be, defence—under electronic control cannot yet be foreseen.'

Sir Roger mentioned the possibility of doubling our living standards within the next 25 years. This could only be achieved by an immense increase in productivity.

'If we are to have greater plenty—more of these things we all want—we must, with an ageing population living on pension and a working population desiring shorter hours of work, be ever searching for ways and means of reducing the manpower content of our goods—we literally cannot afford to use manpower where an instrument can do the job as well or better,' he said. 'Here we need the full measure of your genius because the controlling instrument is, I believe, the most powerful factor of all.'

Sir Roger's last word, as deputy chairman of the Beaver Committee on Air Pollution, was 'as one of your first jobs, help to cure smog!'

BIMCAM, formed in 1944 from an earlier 'Meters and Measuring Export Group', now consists of 32 firms which, it is estimated, represent more than 90 per cent of the productive capacity of the industrial instrument industry in this country. The association is the recognised point of contact between the industry on the one hand and Government departments and users on the other.

The 11th annual BIMCAM luncheon. Left to right: H. W. Arkell, chairman; Sir Edward Boyle, MP; H. W. Blake, president; Sir Roger Duncalfe; W. G. Ardley, founder of BIMCAM; and K. T. Spencer, chief scientist, Ministry of Fuel and Power

New Silicone Rubber

Controlled Reactivity is Special Feature

A NEW type silicone rubber, with important features never before available, it is claimed, has just been announced by the silicones department of Linde Air Products Company, a division of Union Carbide and Carbon Corporation, New York. This silicone is available in production quantities as a gum stock, called W-96 silicone gum.

The secret of the unique properties of W-96, according to Linde, is that a controlled number of reactive groups have been built into silicone molecule. These reactive groups determine the final structure of the cured rubber. It is this 'controlled reactivity' which gives marked advantages in curing the rubber, as well as special properties in the cured product. As far as can be determined, this new gum will do all that previously known methyl silicone gums and their compounds can do, but at the same time possesses many advantages.

Over the years that silicone rubbers have been available, they have firmly established themselves for many applications because of their unique properties. In order to obtain these special properties, however, a great deal of specialised compounding and curing knowledge and techniques had to be developed. The 'controlled reactivity' of W-96, inherent in the gum stock itself, makes unnecessary many of those special techniques. This should mean a reduction in the cost of silicone rubber parts, and consequently the opening of many new fields for silicone rubber. Furthermore, because of the number of variations that can be obtained using the same general curing mechanism and simplified filler systems, this new material should prove of particular interest to the rubber fabricator who will do his own compounding.

Unusually low compression set is one of the properties that should prove of particular importance, especially as these very low values are present over a wide range of hardnesses, using conventional fillers. Negligible sacrifice of tensile and elongation increases the significance of these values. To designers this means a major improvement over other silicone rubbers for gaskets, O-rings and a variety of other moulded parts. Good resistance to high-pressure steam is another new property.

One feature of W-96 that should prove most interesting to rubber fabricators is that this new material can be filled with a variety of carbon blacks. Such compounds are readily cured, because of the 'controlled reactivity' of the gum stock. The carbon-black-filled rubbers exhibit properties similar to those made with the conventional silica fillers. Even semi-conductive silicone rubber is now possible. A considerable amount of physical property and other data for numerous W-96 compounds are available to those desiring to explore further the wide potentials of this new material.

A recent photograph of Albright & Wilson's phosphorus plant at Portishead, near Bristol. Designed capacity is 40,000,000 lb. of phosphorus a year

Canadian Chemistry 1954—And After

Year's End Review of Industry

THE president of Canadian Industries (1954) Ltd., Mr. H. Greville Smith, has stated that for the year 1954 a further advance was recorded in the value of the annual output of chemicals and allied products in Canada. Official figures are expected to show that in 1954 the industry's products had a gross value in the neighbourhood of $900,000,000 compared with $848,000,000 reported for 1953. This increase of almost 6 per cent equalled the average volume increase in the post-war years—though below the record increase of 9 per cent in volume by which the year 1953 surpassed 1952.

In recent years, the expansion of the chemical and allied products industry has been at a higher rate than that of the Canadian economy as a whole. The chemical industry in Canada still has some way to go, however, before reaching its full potential in relation to Canadian industry. Important steps towards greater industrial activity and more diversified manufacture become urgent during periods of national emergency, and in the years 1951 to 1953 new chemical plants valued at nearly $300,000,000 were built. This total exceeded the increase in capital investment suggested by the extent of the expansion of domestic chemical markets and during the next few years there may, therefore, be a margin of new capacity to be absorbed.

Tariff Requests

During this period in which new capacity is being consolidated, the chemical industry's rate of growth may be subjected also to retarding influences. Concern has been expressed within the industry recently as to whether or not growth through diversification can be maintained at its average post-war rate, unless there is some modification of the tariff structure. As the industry becomes more mature, new development is toward more complex products and processes involving larger capital expenditure per unit of output. The authorities now have before them a number of applications for protection against imported products now entering from the United States at little or no duty.

The value of new chemical projects announced in 1954 was in the neighbourhood of $50,000,000 and was at about the same level as for the previous year, but capital investment in 1954 was directed more markedly toward natural resources utilisation. The announcement that a trans-Canada natural gas pipeline will be built and thus ensure early development of western gas resources has prompted consideration of new projects to use gas in production of ammonia and ammonia fertiliser.

More Petroleum Used

The chemical industry is drawing increasingly upon petroleum sources for raw materials, which are being obtained either directly from Canadian natural gas or as by-products from refining crude oil of domestic and foreign origin. At Sarnia extra capacity has recently been added to make ammonia, using hydrogen derived from a new petroleum refining process. Plans to produce polyethylene from refinery gas in Montreal have also been indicated for the future.

Additional capacity is to be provided in Western Canada for the production of elemental sulphur from sour natural gas, and a plant to use this sulphur to make sulphuric acid for the leaching of uranium ores is being erected in Northern Saskatchewan. This will be the first sulphuric acid factory in Prairie Provinces. The West's first alkali-chlorine plant, only recently brought into operation in Alberta, is already to be doubled in capacity to supply chemicals to Alberta's first wood-pulp plant. In Eastern Canada, the year 1954 saw the completion of a plant to use a new process for making sulphur and sulphur dioxide from sulphide flotation tailings and the announcement of a further plant to utilise smelter fumes to produce fertiliser.

New plant projects not related to natural resources include a first unit in Canada to make fluorinated refrigerants; a plant to produce a food flavour additive, monosodium glutamate; a second phthalic anhydride plant to serve the growing alkyd resin enamel industry; and factories for the production of emulsifiers, lubricating oil additives and pigments.

With the addition of a large polythene plant at Edmonton during 1954 and the active development of new uses for plastics, the primary plastics group gained in sales volume, though subject to considerable competition from the United States.

Important additions to Canada's research facilities were announced during the past year. Canada is still at the stage where research abroad provides the base for many new developments, but no country, of course, is so advanced in research that it can afford to disregard original investigations in other countries.

This Year's Prospects

The chemical business of Canada is expected to be favourable in 1955, it is stated by some important executive officers of the industry.

Mr. N. R. Crawford, president of Dow Chemical of Canada, in a new year's comment, declared: 'If business as a whole is to be good in 1955, the chemical business should be good. Present readings of most of the forecast barometers indicate that it will be. This is not to say that all products will receive wide distribution or that all companies will be operating at top level. There is currently excess capacity in Canada for certain chemicals and many plants will fit the market better in a few years than they do today.

'Modernisation of existing plants and replacement of obsolete or abandoned ones will probably take precedence over the construction of plants for new products during 1955. In fact this may continue for some time until certain unfavourable factors are overcome. Among these are tardiness on the part of the Federal Government in modernising the outmoded chemical tariff, reluctance of certain foreign countries, including many in the Commonwealth, to relax their import controls, and the delay in returning to world convertibility of currencies.'

Mr. Herbert H. Lank, president of Du Pont of Canada, stated: 'It is my opinion that the general level of business in 1955 will closely approximate the level achieved in 1953. The prospects for the maintenance of a high level of employment are good and with suitable weather conditions, the slump in employment in seasonal industries which was experienced in 1954 should not be as severe.'

Golden Jubilee

Bombed Out Firm Started Again

CELEBRATING their golden jubilee some time at the beginning of this year are the firm of Bryce, Robarts & Co. Ltd., exporters of chemical products and raw materials, of Cree House, Creechurch Lane, London E.C.3. The exact date is not known, as the firm's records were all lost when their original premises in Great Tower Street were destroyed in the big fire raid on London in December 1940.

The company was founded as Charles C. Bryce & Co. in 1905 by Mr. Charles Chalmers Bryce, son of the founder of Bryce & Rumpff of Glasgow, one of the leading chemical merchants and dye stockists of the time, who were the first to introduce German dyestuffs into this country.

In 1908 Mr. Francis Watson Robarts, who was later killed in the first world war, joined the company and the name was changed to Bryce, Robarts & Co. It was incorporated as a limited liability company in 1923 with Mr. Charles Chalmers Bryce as managing director, the other directors being Mr. Albert David Howlett and Mr. Alexander Elder.

Mr. Howlett became governing director in 1934 after the death of Mr. Bryce and took over all the financial interests of the company. This year he completes his 40th year with the firm.

When the old premises were bombed, the firm started up again in a solicitor's office with only a portable typewriter 'and our memories.' In February, 1941, they moved into the present premises.

Shipment to Poland

Bryce, Robarts & Co. export chemicals and raw materials to nearly every country in the world with the exception of the Soviet bloc. Before the war they used to trade with Eastern Europe, and one of their last shipments to Poland was in a boat that left on 3 September, 1939, the day war was declared. They never received the money.

In his years with the firm, Mr. Howlett has seen changes in the chemical export trade. The firm is sharing in the general industrialisation of the world and orders today are far larger than they were in the early days. At the same time, about 40 per cent of the business is concerned with exports from one overseas country to another, as opposed to the sale of British products.

METALLURGY OF THE NON-FERROUS METALS. By W. H. Dennis. Sir Isaac Pitman & Sons Ltd., London. 1954. Pp. 647. 70s.

The literature of metal production appears surprisingly restricted when the fundamental importance of the subject to our modern civilisation is considered. Perhaps, because of its extreme specialist character, authors have tended to neglect it in favour of material with more general appeal. A textbook such as the one under review, in which the extraction and refining of the non-ferrous metals and their more common alloys are considered in detail, is particularly welcome. The author has collected together information which will be of value not only to the student and the chemist immediately involved in metal production, but also to those who work and use the metals and alloys produced.

Because of its great importance, the metallurgy of copper is treated at greater length than that of the other non-ferrous metals, and the account includes a short description of the reclamation of copper from scrap, a process often as valuable as the primary production. The first chapter is a general one dealing with physical processes encountered in the extraction and refining of metals from the crude ores; there follow 21 further chapters each describing a separate metal or group of metals. In an otherwise excellent text the chapter describing the separation of the rare earths appears scrappy and disjointed. Much space is devoted to the separation and isolation of individual rare earth salts by fractional crystallisation and by graded elution from ion exchange columns, while the practice of liquid-liquid extraction which has proved very successful in this field is given very little attention.

On the other hand the author has sketched in the background to the rapid post-war development of uranium metallurgy by including a brief account of the production and utilisation of atomic energy for civil and military purposes. Further information supplementary to this appears in the chapter upon radium which contains a description of industrial radiography and the industrial use of radioactive isotopes such as cobalt 60. The book contains a great deal of information which is of general interest, most chapters include details of the physical properties of the metals and their more important alloys, and there are many bibliographies. Three appendices provide useful conversion tables, physical properties of the elements and the characteristics of minerals.—J.R.M.

ATOMIC ENERGY & ITS APPLICATIONS. By J. M. A. Lenihan. Sir Isaac Pitman & Sons Ltd., London. 1954. Pp. 265. 22s. 6d.

Considering the enormous volume of publication on atomic energy, one might at first be inclined to think that any book presuming to cover the whole subject in 250 pages would necessarily be so superficial as to be almost useless. Dr. Lenihan has, however, succeeded in packing into this little volume a very clear account of the fundamentals of the subject, together with a surprising amount of numerical data and references. This has been achieved by admirably concise and orderly writing, coupled with the extensive use of tables and diagrams. The book is intended as an introduction to atomic energy for scientists who specialise in other fields, but whose work brings them into contact with the applications of atomic energy—medical, industrial, or whatever they may be. It can also be recommended as a textbook for university students in science or medicine.

The subjects covered are the fundamentals of nuclear structure and radioactivity, the detection and measurement of radiation, nuclear reactions, particle accelerators and nuclear reactors, protection from radiation, and the military, medical, industrial and scientific applications of nuclear power and its by-products.

A table is provided giving details of nearly all the presently operating nuclear reactors, so far as these have been released. This table gives type of reactor, nature of moder-

ator and coolant, power level, size of reactor core, overall size, maximum neutron flux and working temperature. There are many other similar tables, giving in readily accessible form masses of information directly useful to scientific workers, and otherwise only obtainable from scattered sources.

Here and there one finds a statement which is inaccurate or poorly-expressed. For example, the voltages used in superficial X-ray therapy now range upwards from 10 kV, not 80 kV as stated. These, however, are small blemishes on an otherwise excellent book.—H. G. HEAL.

ELECTRO-PLATING AND CORROSION PREVENTION. Edited by E. Molloy. George Newnes Ltd., London. 1954. Pp. vii + 278. 18s.

This book sets out to provide a handbook of practice in the important field of electroplating and surface protection. The editor is to be congratulated upon the enormous amount of information which has been packed into a small volume, without the omission of practical detail. It is indeed a pleasure to find a book such as this which does exactly what it sets out to do.

Fundamental theoretical principles are quickly but adequately disposed of, and the major portion of the book is devoted to a concise statement of operating techniques in a range of processes applied to various industries. A complete index makes it simple to find any particular process of interest, and there to find precise and detailed information upon the electrolyte composition, operating temperatures and current conditions, with an illustration of a typical layout and plant in most instances. These illustrations are particularly clear and helpful—there are about 100 of them in 260 pages of text.

This is a book for practical men, and should prove very popular with those who, for any reason, wish to know exactly how to carry out any of the modern processes of surface finishing.—T. K. ROSS.

PROCEEDINGS OF THE THIRD INTERNATIONAL SYMPOSIUM ON THE CHEMISTRY OF CEMENT, LONDON 1952. Cement and Concrete Association. 1954. Pp. xxxviii + 870.

The proceedings of the international symposium amounted to 22 papers, including one on 'Chemical Aspects of Cement Durability' by Professor T. Thorvaldson, of the University of Saskatchewan, of which a condensed version appeared in THE CHEMICAL AGE (1952, **67**, 427-432). This and the others are now printed in full, together with the contributions made to the discussions which followed the main papers, and diagrams and photographs.

The subjects covered in this large volume include the properties of various types of cement, cements for special purposes, cement manufacturing techniques and the early history of cement in England. The closing address to the symposium, 'Cement Research and the Future', by Dr. F. M. Lea, is printed as a foreword.

THE NATIONAL FORMULARY, 1955. The National Formulary Committee. The British Medical Association and The Pharmaceutical Press, London. 1955. Pp. 210. 5s. (interleaved copies 8d.).

The Joint Formulary Committee, representing the medical and pharmaceutical professions, has just issued the third edition of The National Formulary. In the second edition, published in 1952, English headings to the subsections were welcomed by progressive people as an important innovation as it was felt that it would offer an opportunity for more rational grouping and a gradual transition to the use of English in prescribing. Unfortunately, progress on these lines has not continued; due to pressure from reactionary members of the two professions the Committee have returned to traditional style and arrangement. In The National Formulary 1955, therefore, Latin is used for the titles of each group of preparations and abbreviated Latin for the main titles of individual preparations.

In the section devoted to the pharmacological classification page references to preparations appearing in the formulary section have been added—a welcome addition. Where possible, doses are given both in imperial and metric units. In order to make room for new material, several well-known but antiquated prescriptions have been deleted from the 1952 Formulary. In general (apart from surrendering to retrograde medical practitioners and pharmacists) the committee has done an excellent job.—A.B.C.

HOME

Buffet Dance

The London Sections of the Royal Institute of Chemistry and the Society of Chemical Industry announce a buffet dance to be held at the Caxton Hall, Westminster, on 26 February. Tickets are 12s. 6d. each, including buffet, and are limited to 340. Members of the two bodies, and kindred societies, and their friends are invited.

Conference Postponed

The Stress Analysis Group of The Institute of Physics announces that the ninth annual conference due to be held in Sheffield from 23 to 25 March has had to be postponed. It will now be held from 28 to 30 September. Reason for the postponement is a disappointing response by members to the appeal for papers and contributions. In the time at their disposal the committee has been unable to arrange a full programme.

Hydrofluoric Acid for Atomic Energy

The Consolidated Zinc Corporation Ltd. announce that their subsidiary, Imperial Smelting Corporation Ltd., has obtained a substantial contract to supply over the next two years anhydrous hydrofluoric acid for the UK Atomic Energy Authority. Imperial Smelting Corporation have been supplying for the past three years the bulk of the authority's requirements of the acid.

Glass Technology Scholarships

The Worshipful Company of Glass-Sellers of London offer up to four scholarships in Glass Technology at Sheffied University, which in suitable circumstances qualify for supplement by the Ministry of Education up to the full value of State scholarships. The scholarship examination consists of papers in chemistry, physics and pure mathematics (two as primary subjects and one as a secondary subject) together with an English language paper. Applications for entry should be made to the University by 26 February, 1955, but in subsequent years by the middle of January. Entry forms, syllabuses, etc., may be obtained from the Registrar, University of Sheffield, Sheffield 10. Entries for 1955 should be made immediately and the examination begins at the University on 21 March.

Change of Address

Matthews & Yates Ltd., manufacturers of cyclone fans and fan equipment, announce that they have transferred their London office to larger premises at 135 Rye Lane, Peckham S.E.15 (Tel.: New Cross 6571).

Textile Conference

The Textile Department of the Royal Technical College, Glasgow, is sponsoring a three-day conference from 14 to 16 April on 'Newer Developments in Textile Fibres'; the conference will cover the most recent work in the field.

British Ceramic Society Meeting

The spring meeting of the Building Materials Section of The British Ceramic Society is to be held on Wednesday, 30 March, at the Three Tuns Hotel, Durham, starting in the late morning. A programme of papers is to be read and discussed, and in the evening there will be an informal dinner. On 31 March visits are to be paid to Crossley Building Products Ltd. and Eldon Brickworks Co. Ltd., Bishop Auckland.

Gold Watches Presented

Gold watches were presented to two members of the firm of Baird & Tatlock (London) Ltd., who have retired, at a dinner given by the directors at the Waldorf Hotel, London, on 12 January. Mr. W. J. Scott, who was manager of the chemical division until his retirement last October, had completed over 50 years' service with the company. Mr. H. Towell, who had during the whole of his career been actively engaged in the export field, had 44 years with the firm.

Monsanto Fire

A fairly large section of warehouse at the Monsanto chemical factory, Cefn Mawr, was badly damaged on 20 January by fire and chemicals packed in cardboard containers for export were destroyed. The fire swept through four bays, but fire brigades from Wrexham, Llangollen, Chirk, as well as the works brigade, prevented the flames from enveloping the entire building. The roof, however, was soon a mass of tangled and twisted ironwork. An official stated that, although chemicals and a stock of containers had been destroyed, the loss of stock was not very serious.

• OVERSEAS •

US Synthetic Rubber Sales Up

US Government sales of synthetic rubber are expected to reach record levels in the next few months, partly because of increases in the price of natural rubber.

More Room

Northern Pigment Company, of New Toronto, Ontario, is adding to its laboratory, warehouse and office space. The company manufactures ferrite oxides of iron used in manufacture of paint, roofing, flooring, rubber, concrete bricks, coloured cement, mortar, plaster and other items. It exports to some 15 countries.

Nickel Refinery Plans

Sherritt Gordon Mines have announced further improvements and additions to the Fort Saskatchewan refinery during the next six months. They are designed to secure operations at full capacity and also to increase the capacity as soon as possible. In December the plant produced 641 tons of nickel metal, about 90 per cent of rated capacity.

Swedish Nitre Plant Extensions

The Federation of Swedish Farmers' Associations has acquired half the share capital in the nitre works at Köping, formerly owned entirely by the Swedish Co-operative Union. The works are being extended to use as raw material the 20,000 tons of ammonia which will be produced from shale-oil gas at a new plant belonging to the Government Shale Oil Works at Kvarntorp, 30 miles from Köping.

Strike-Free Israel Factory

The Haklith Company, Israel's first plastics factory, and its founder director, Mr. Bruno Rabinovitz, were fêted at the plant in the Haifa industrial zone recently, on the occasion of the company's 20th anniversary. For five years before World War II, Haklith was the only company in its field, and during the war it was an important source of supply for the Middle East. There has never been a labour dispute in the factory, and not a single hour has been lost by strikes, Mr. Rabinovitz said.

Break-Up Law Soon

It is expected that the final IG Farben decartelisation law will be published by the Allied High Commission in Germany next week. This law will complete the break-up of the combine by returning the IG Farben Company in liquidation under German jurisdiction.

Dow to Produce in Holland

A factory for producing chemicals, plastics and magnesium is to be set up by the Dow Chemical Company of America in Rotterdam. It will be run by a new Dutch company and production is expected to start in the middle of next year.

Sulphur Concession Refused

The Texas Gulf Sulphur Company has been refused a concession by the Iraq Government for the exploitation of the country's sulphur deposits because the terms submitted by the company are described as 'unsecure to Iraq's full rights.' The Government has decided to engage a foreign expert to study the sulphur deposits and report on the possibilities of exploiting them.

Ferro-Manganese Licences

The Government of India has granted licences for the manufacture of ferro-manganese to five firms—Tata Iron & Steel, Jaypore Mining Syndicate, Indian Ferro-Alloy, Kambata Industries and Madhyapradesh Electric Metallurgical Works. Combined installed capacity will be 105,000 tons a year.

US 'Dumping' Complaint

A complaint that American firms were taking advantage of the easier dollar import regulations to dump chemicals in Sweden was made recently by the Swedish newspaper, *Dagens Nyheter*. 'The prices on the American home market are often considerably higher than in Europe' the paper said. 'To compete with European producers the Americans must therefore sell considerably cheaper in the export markets than they do at home. Recently an important chemical was offered for sale in Europe at only 60 per cent of the American home market price.'

· PERSONAL ·

MR. RONALD PETER MORRISON, QC, has been appointed independent chairman of the executive committee of the British Iron and Steel Federation in succession to the late MR. FREDERICK GRANT.

The appointment of DR. E. HOLMES, B.Sc., M.Sc., Ph.D., F.R.I.C., as technical and development director of Plant Protection Ltd., has been announced. Dr. Holmes is chairman or a member of several Government and other technical committees on crop protection. He was president of the Industrial Pest Control Association from 1944 to 1946 and chairman of the Association of British Insecticide Manufacturers from 1951 to 1953. He was appointed head of the technical department of Plant Protection Ltd. in 1940.

The following I.C.I. appointments take effect from 1 February: MR. C. PAINE is to be development officer; MR. C. R. PRICHARD is to be joint overseas director with MR. E. A. BINGEN; MR. W. D. SCOTT is to be director in charge of Group C (Ammonia and Agriculture); and MR. R. C. TODHUNTER is to be director in charge of Group E (Paints and Plastics).

DR. J. AVERY, B.Sc., Ph.D., who has been joint managing director of the Dyestuffs Division of Imperial Chemical Industries Ltd. since 1952, has been appointed chairman of the Division. A native of Durham, Dr. Avery joined the Dyestuffs Division in 1928 and has served it since in varied capacities including those, in recent years, of production manager and production director. From 1947 to 1952 Dr. Avery was a delegate director of Imperial Chemical (Pharmaceuticals) Ltd. In 1952 he was appointed a visiting member of the Plastics Division board. MR. H. SMITH, B.Sc. (Hons.), M.Sc., D.I.C., has been appointed joint managing director (technical) of the division in succession to Dr. Avery. Mr. Smith joined I.C.I. in 1929 after a distinguished academic career at the Imperial College of Science and Technology. He has been Dyestuffs Division production director since November 1952. DR. C. R. MAVIN, M.Sc., Ph.D., becomes production director of the Dyestuffs Division, relinquishing his membership of the Pharmaceuticals Division board. Dr. Mavin is 45. He joined I.C.I. in 1933, became assistant works manager of Blackley Works in 1942 and was works manager, Dalton Works, Huddersfield, from 1947 to 1953. In 1953 he was appointed Dyestuffs Division production manager and in the same year a director of Imperial Chemical (Pharmaceuticals) Ltd.

Several organisational changes in the market development and sales departments of the Plastics Division of Celanese Corporation of America have been announced. DR. W. P. MOELLER has been named manager, market development department, replacing DR. W. E. HOLLAND, resigned. MR. J. W. FLYNN, previously director of sales, sheet and moulding compounds, moves into the post of assistant manager of the market development department. He is succeeded by MR. R. M. LEITER. MR. W. G. WEST, who has been associated with Curtiss-Wright Corporation and Spencer-Kellogg & Sons Inc., and MR. H. S. MALBY, formerly with Crane Engineering Corporation and Horace Blackhan Company, have joined the market development department.

At the 27th annual general meeting of the Industrial Welfare Society on 18 January the following new members of the Council were elected: MR. R. A. BANKS (I.C.I.); COL. L. BESWICK (Williamson & Sons Ltd.); LORD BILSLAND (Scottish Regional Board for Industry); MR. J. M. CAMPBELL (Booker Brothers, McConnell Ltd.); MR. H. S. GIBSON (Iraq Petroleum Co. Ltd.); SIR FREDERICK JAMES (Tata Ltd.); MR. LAWRENCE NEAL (Daniel Neal & Son); SIR HENRY SELF (British Electricity Authority); EARL OF VERULAM (Enfield Cables Ltd. and other companies).

It has been announced that MR. R. S. WRIGHT, B.Sc., A.R.I.C., has been appointed production director of Imperial Chemical (Pharmaceuticals) Ltd. Mr. Wright, who is 39, has been works manager of the Huddersfield Works of I.C.I. Dyestuffs Division for the past two years. He gained First Class Honours at University College, Nottingham, and joined the company in 1937, serving at the Grangemouth and Blackley Works and

then in the Techno-Commercial Department of the Dyestuffs Division. Later he was head of the Thionol Department and assistant works manager of first Blackley and then Grangemouth.

Having been appointed deputy head of I.C.I.'s industrial hygiene research laboratory, The Frythe, Welwyn, Herts, DR. C. M. SCOTT, M.A., M.D., Ch.B., D.Sc., has relinquished his seat on the board of Imperial Chemical (Pharmaceuticals) Ltd. Dr. Scott is a Durham man and had a distinguished career at Edinburgh University. Gaining his M.A. in 1922, he obtained his medical qualifications four years later. While lecturing at the University between 1929-36 he obtained his D.Sc. As a Fellow of the Rockefeller Foundation he was at the University of Heidelberg in 1936 and the University of Brussels in 1937. It was in 1937 that he joined I.C.I. Dyestuffs Division as head of the Biological Department and in 1942 he became a director of I.C.(P.).

It is announced that MR. J. ARTHUR REAVELL, M.I.Mech.E., M.I.Chem.E., F.Inst.F., F.I.M., chairman of the Kestner group of companies, has left for a visit to South Africa and Southern Rhodesia. He will be spending a few weeks at the headquarters of Kestners (South Africa [Proprietary]) Ltd. in Johannesburg and also visiting the principal towns of the Union and Southern Rhodesia during his tour.

DR. V. G. JOLLY, B.Sc., Ph.D., F.R.I.C., who has been with Walpamur Co. Ltd. since 1925, has been appointed to the board as research director. He was chairman of the Manchester Section of the Oil and Colour Chemists' Association from 1934 to 1936, is a member of the Technical Advisory Committee at the Paint Research Station and represents the Paint Federation on committees of the British Standards Institution. In 1946 he was a member of the BIOS team which investigated the German paint industry.

New president of the British Printing Ink Association is MR. R. M. C. NUNNELEY, of B. Winstone & Sons Ltd. He was elected at the recent annual general meeting. MR. K. B. PARRACK, of Ault & Wiborg Ltd., was elected vice-president. The retiring president, MR. J. B. M. COATES, had held the office since 1952.

MR. A. E. BELL has been appointed sales manager (engineering) of the Distington Engineering Co. Ltd., Workington, Cumberland.

Formerly deputy director and research manager at the Paint Research Station and more recently technical director at General and Industrial Paints Ltd., MR. E. W. M. FAWCETT is joining Howards of Ilford Ltd. as research manager.

Obituary

The death occurred on Monday of MR. JAMES GERSTLEY, deputy chairman of Borax Consolidated Ltd. He was 87. One of the founders of the company and a joint managing director, Mr. Gerstley had been connected with the borax industry for more than 60 years.

MR. ALEXANDER MURDOCH, A.R.T.C., A.R.I.C., of Westerton, Glasgow, late chief analytical chemist with the United Co-operative Baking Society Ltd., of Glasgow, died suddenly on 18 January. He had been associated with the company for many years and was also prominent in chemical society activity in the west of Scotland.

The death occurred on 17 January of MR. GEORGE WILLIAM CLEMENTS at his home in Hightown Road, Liversedge, at the age of 74. Mr. Clements served on the staff of Cleckheaton Chemical Co. Ltd., heavy chemical manufacturers, Cleckheaton, for 49 years. He joined the firm as an office boy, rose to senior clerk and then became an outside representative, a position he held until his retirement in 1944.

Aged 69, MR. CHARLES HERBERT HAMPSHIRE, C.M.G., M.B., B.S., B.Sc., F.P.S., F.R.I.C., formerly secretary of the British Pharmacopœia Commission, died on 25 January in University College Hospital, after a short illness.

DR. GEORGE MARTIN LEES, M.C., D.F.C., F.R.S., who was for nearly 23 years chief geologist to the Anglo-Iranian Oil Co. Ltd. before his retirement in 1955, died in hospital in London on 25 January, aged 56. He was largely responsible for the discovery of oil in Britain.

A view of the new Manchester showrooms of Baird & Tatlock (London) Ltd., which were opened on 10 January

Packaging Stands

PROBABLY the largest stand at the Packaging Exhibition at Olympia, which closes on 28 January, is that of Metal Containers Ltd. and its associated companies, F. Robinson & Co., Van Leer Industries and Cyclops Engineering Co. A row of revolving drums, each with one of the letters contained in the different titles painted on its four sides, spell out the names of the firms in succession.

On display are the range of goods produced by the companies—drums, kegs, pails for the transport of liquids, powders, pastes, solids, etc. There are containers made of mild steel with alternative finishes and examples of containers externally decorated to meet requirements of individual customers. On a separate stand the Trisure system of drum closure, which prevents leakage, contamination and unsuspected tampering, is demonstrated.

A feature of the Metal Box Co. Ltd.'s stand is a machine for sealing beer cans. The firm display their full range of metal packages used in a large variety of industries, and Aerosol dispensers with different ingredients, including insect spray, are being shown for the first time. Also exhibited are the uses of Diothene, the firm's polythene film.

Sloping top drums which prevent liquid collecting inside the rim are featured by E. A. Brough & Co. Ltd. who also display the full range of their metal drums for use in the chemical, oil and other industries.

Wrapping machines made by Maison Sapal, Lausanne, Switzerland, are exhibited by Bramigk & Co. Ltd. Two types of machine are shown, one being designed for wrapping small tablets and the other being adjustable for all moulded coated sweets.

Among the products displayed by Essex Aero Ltd. are stackable refrigeration trays which can be loaded direct into insulated vans from cold rooms and stacked easily and compactly.

More Sodium Sulphate

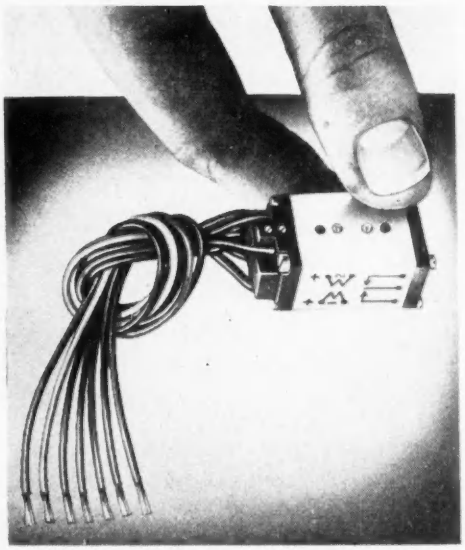
TO meet increasing demand for sodium sulphate, the Saskatchewan Government is reopening and expanding two plants which have been out of production since 1951. Already operating under provincial control is the original $1,000,000 installation at Chaplin, Sask.

Purchased from Natural Sodium Products Ltd., for a reported $200,000 by government-owned Saskatchewan Minerals Corp., are the Bishopric plant near Moose Jaw where the province's sodium sulphate reserves were first exploited, and the Alsask plant on Alberta boundary.

A $300,000 expansion programme planned at Bishopric will bring capacity there to the level of Chaplin which sold $600,000 of sodium sulphate 'salt cake' last year. Some 95 per cent of the Saskatchewan sodium sulphate production goes to paper manufacturers. Private plants operate also at Palo, Ormiston and Gladmar, Saskatchewan.

Publications & Announcements

RECENTLY released by Electro Methods Ltd., Caxton Way, Stevenage, Herts, is a miniature moving-coil relay, type 415/416. The relay consists of a balanced moving-coil in the field of a permanent magnet. The coil has a contact leaf which operates between two adjustable contact springs mounted on the fixed frame. The coil assembly moves to one side or the other and appropriate contact is made according to the direction of the controlling current. The coil has two independent windings which can be wired singly,



in series, in parallel or in differential according to the application. The miniature moving-coil relay fulfils the need for a magnetically self-shielded unit capable of operating from a power input of 10 microwatts and being of balanced construction functions efficiently in any position. The design is extremely compact, the overall measurements of the relay being $1\frac{1}{8} \times \frac{3}{4} \times \frac{5}{8}$ in. The sensitivity of these relays permits extremely close temperature control when used with a resistance thermometer in a bridge circuit. Similarly, such applications as self balancing bridges will give close control without the use of an additional electronic amplifier.

* * *

RECENTLY published by the Federation of British Industries, the 1955 edition of *Fuel Economy Review* contains eight articles, most of them illustrated and totalling over 60 pages, on the economic and technical aspects of the subject. The introduction points out that it has been necessary to import 4,000,000 tons of coal this winter, the demand for fuel is still rising and spectacular improvements in coal production are remote. On the other hand, the results obtainable from the more efficient use of fuel can be immediate. Among the articles is one on 'Recent Developments in the Gas Industry' and one on 'Heat Recovery in Graphite Heat Exchangers.'

* * *

SHARPLES Centrifuges Ltd., of Tower House, Woodchester, Stroud, Glos, have just issued a bulletin, No. 1654, which shows their new range of Super-Centrifuges. The principle of the Super-Centrifuge is well tried, and results in the material treated being subjected to a centrifugal force of greater than 13,000 times the force of gravity. This is substantially greater than that obtainable with any other type of commercial centrifuge, it is claimed, and it results in a correspondingly higher purifying force. This bulletin shows modern developments in the design of the Super-Centrifuge, and illustrates the recently developed range of new models incorporating such features as vertically mounted motors, direct driven pumps, etc.

* * *

VACUUM Oil Company's latest film, *The Story of Coryton*, shows how a flat stretch of Essex marshland on the north bank of the Thames was transformed into Britain's newest refinery. 1,000,000 tons of crude oil are processed every year at Coryton in its various highly complicated units, but a description of them is not included as this would be outside the scope of a documentary which is essentially non-technical. The film takes the story up to the official opening of the refinery by Her Majesty Queen Elizabeth, the Queen Mother. *The Story of Coryton* is a 16 mm. film in black and white, and runs for approximately 30 min. It was written and directed by Mr. David H. Villiers, and the music was composed and conducted by Mr. R. Goodwin. Copies will shortly be available on request from: The Film Library, Sound Services Ltd., 269 Kingston Road, Merton Park, London S.W.19.

British Chemical Prices

(These prices are checked with the manufacturers, but it must be pointed out that in many cases there are variations according to quantity, quality, place of delivery, etc.)

LONDON.—Active conditions have again been reported on the industrial chemicals market. Export demand continues satisfactory and there has been a good flow of new buying orders from the UK consuming industries. Price movements have been within narrow limits and the general price structure remains firm. There is a steady outlet for most of the coal tar products with quotations firm and unchanged.

MANCHESTER.—From the point of view of contract deliveries a fairly active demand from the textile bleaching, dyeing and finishing trades has been reported on the Manchester market for heavy chemicals during the past week, and steady supplies are also being called for by other leading industrial consumers in the Lancashire area. A fair number of additional home and export inquiries have been dealt with during the past few days. In the market for fertiliser materials a steady demand for the higher grades of basic slag continues, with a moderate weight of new business placed in most other lines. Taking the tar products market as a whole, a fairly steady movement of supplies is reported.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 10 tons, £83 ; 80% pure, 10 tons, £89 ; commercial glacial, 10 tons, £91 ; delivered buyers' premises in returnable barrels (technical acid barrels free) ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £130 per ton.

Alum.—Ground, about £23 per ton, f.o.r. MANCHESTER : Ground, £25.

Aluminium Sulphate.—Ex works, £14 15s. per ton d/d. MANCHESTER : £14 10s. to £17 15s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—5-cwt. casks, Powdered : 1-ton lots, £60 per ton.

Ammonium Chloride.—Per ton lot, in non-returnable packaging, £27 17s. 6d.

Ammonium Nitrate.—D/d, £31 per ton (in 4-ton lots).

Ammonium Persulphate. — MANCHESTER : £6 5s. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £97 and £94 10s. per ton.

Antimony Sulphide.—Crimson, 4s. 4d. to 4s. 9½d. ; golden, 2s. 7½d. to 4s. 0¾d. ; all per lb., delivered UK in minimum 1-ton lots.

Arsenic.—Per ton, £45 to £50 ex store.

Barium Carbonate.—Precip., d/d : 4-ton lots, £39 per ton ; 2-ton lots, £39 10s. per ton, bag packing.

Barium Chloride.—£42 15s. per ton in 2-ton lots.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £42 10s. per ton d/d ; 2-ton lots, £43 per ton d/d.

Bleaching Powder.—£27 17s. 6d. per ton in returnable casks, carriage paid station, in 4-ton lots.

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid : Anhydrous, £58 10s. ; in 1-cwt. bags ; commercial, granular, £38 10s. ; crystal, £41 ; powder, £42 ; extra fine powder, £43 ; BP, granular, £47 10s. ; crystal, £50 ; powder, £51 ; extra fine powder, £52.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid : Commercial, granular, £67 ; crystal, £75 ; powder, £72 10s. ; extra fine powder, £74 10s. ; BP, granular, £80 ; crystal, £84 10s. ; powder, £87 ; extra fine powder, £86 10s.

Calcium Chloride.—Per ton lot, in non-returnable packaging : solid, £15 ; flake, £16.

Chlorine, Liquid.—£32 per ton, in returnable 16-17-cwt. drums, delivered address in 3-drum lots.

Chromic Acid.—2s. 0⅝d. per lb., less 2½%, d/d UK, in 1-ton lots.

Chromium Sulphate, Basic.—Crystals, 7½d. per lb. delivered (£70 per ton).

Citric Acid.—1-cwt. lots, £10 5s. cwt. ; 5-cwt. lots, £10 cwt.

Cobalt Oxide.—Black, delivered, bulk quantities, 13s. 2d. per lb.

Copper Carbonate.—2s. 6d. per lb.

Copper Sulphate.—£87 10s. per ton f.o.b., less 2% in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £9 12s.

Formaldehyde.—£37 5s. per ton in casks, d/d.

Formic Acid.—85%, £86 10s. in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1.260 S.G., £13 3s. 6d. to £13 14s. 6d. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hydrochloric Acid.—Spot, about 12s. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £124 10s. per ton. 35% wt. £153 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 17s. 7d. per lb., in 28-lb. lots.

Iodoform.—£1 6s. 7d. per lb., in 28-lb. lots.

Lactic Acid.—Pale tech., 44 per cent by weight £122 per ton ; dark tech., 44 per cent by weight £73 per ton ex-works ; dark chemical quality, 44 per cent by weight, £112 per ton, ex-works ; 1-ton lots, usual container terms.

Lead Acetate.—White : About £147 to £149 per ton.

Lead Nitrate.—About £128, 1-ton lots.

Lead, Red.—Basis prices per ton. Genuine dry red lead, £132 5s. ; orange lead, £144 5s. Ground in oil : red, £150 ; orange, £162.

Lead, White.—Basis prices : Dry English in 5-cwt. casks, £137 10s. per ton. Ground in oil : English, 1-cwt. lots, 178s. per cwt.

Lime Acetate.—Brown, ton lots, d/d, £40 per ton ; grey, 80-82%, ton lots, d/d, £45 per ton.

Litharge.—£134 5s. per ton, in 5-ton lots.

Magnesite.—Calcined, in bags, ex works, about £28 per ton.

Magnesium Carbonate.—Light, commercial, d/d, 2-ton lots, £84 10s. per ton, under 2 tons, £92 per ton.

Magnesium Chloride.—Solid (ex-wharf), £16 per ton.

Magnesium Oxide.—Light, commercial, d/d, under 1-ton lots, £245 per ton.

Magnesium Sulphate.—Crystals, £15 per ton.

Mercuric Chloride.—Technical Powder, £1 8s. 9d. per lb., in 5-cwt. lots ; smaller quantities dearer.

Mercury Sulphide, Red.—£1 11s. 3d. per lb., for 5-cwt. lots.

Nickel Sulphate.—D/d, buyers U.K. £170 per ton. Nominal.

Nitric Acid.—80 Tw., £35 per ton.

Oxalic Acid.—Home manufacture, minimum 4-ton lots, in 5-cwt. casks, about £131 per ton, carriage paid.

Phosphoric Acid.—Technical (S.G. 1.700) ton lots, carriage paid, £92 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 3½d. per lb.

Potash, Caustic.—Solid, £93 10s. per ton for 1-ton lots ; Liquid, £36 5s.

Potassium Carbonate. — Calcined, 96/98%, about £63 per ton for 1-ton lots, ex-store.

Potassium Chloride.—Industrial, 96%, 1-ton lots, about £22 per ton.

Potassium Dichromate.—Crystals and granular, 11⅜d. per lb., in 1-ton lots, d/d UK.

Potassium Iodide. B.P., 14s. 1d. per lb. in 28-lb. lots ; 13s. 7d. in cwt. lots.

Potassium Nitrate.—In 4-ton lots, in non-returnable packaging, paid address, £63 10s. per ton.

Potassium Permanganate.—B.P., 1-cwt. lots, 1s. 8½d. per lb. ; 3-cwt. lots, 1s. 8d. per lb. ; 5-cwt. packed in 1-cwt. drums, £8 12s. 6d. per cwt. ; packed in 1 drum, £8 11s. 6d. per cwt. ; 1-ton packed in 5-cwt. drums, £8 7s.

Salammoniac.—Per ton lot, in non-returnable packaging, £45 10s.

Salicylic Acid. — MANCHESTER : Technical 2s. 7½d. per lb. d/d.

Soda Ash.—58% ex-depot or d/d, London station, about £15 5s. 6d. per ton, 1-ton lots.

Soda, Caustic.—Solid 76/77% ; spot, £26 to £28 per ton d/d. (4 ton lots).

Sodium Acetate.—Commercial crystals, £80 to £85 per ton d/d.

Sodium Bicarbonate.—Per ton lot, in non-returnable packaging, £15 10s.

Sodium Bisulphite.—Powder, 60/62%, £40 to £42 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—Per ton lot, in non-returnable packaging, paid address, £59 5s.

Sodium Chlorate.—£75 per ton in free 1-cwt. drums, carriage paid station, in 4-ton lots.

Sodium Cyanide.—96-98%, £113 5s. per ton lot in 1-cwt. drums.

Sodium Dichromate.—Crystals, cake and powder, 10d. lb. Net d/d UK, minimum 1-ton lots; anhydrous, 11½d. lb. Net del. d/d UK, minimum 1-ton lots.

Sodium Fluoride.—Delivered, 1-ton lots and over, £4 10s. per cwt.; 1-cwt. lots, £5 per cwt.

Sodium Hyposulphite.—Pea crystals £34 a ton; commercial, 1-ton lots, £30 15s. per ton, carriage paid.

Sodium Iodide.—BP, 17s. 1d. per lb. in 28-lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £127 per ton.

Sodium Metasilicate.—£22 15s. per ton, d/d UK in ton lots.

Sodium Nitrate.—Chilean Industrial, over 98% 6-ton lots, d/d station, £27 10s.

Sodium Nitrite.—£32 per ton (4-ton lots).

Sodium Percarbonate.—12½% available oxygen, £8 2s. 10½d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots: Di-sodium, crystalline, £37 10s., anhydrous, £81; tri-sodium, crystalline, £39 10s., anhydrous, £79.

Sodium Silicate.—75-84 TW. Zoned. Drums delivered station. Lancashire and Cheshire, 4-ton lots, carriage paid station, £10 10s. per ton.; Dorset, Somerset and Devon, £3 17s. 6d. per ton extra; Scotland and S. Wales, £3 per ton extra. Elsewhere in England, excluding Cornwall and Wales, £1 12s. 6d. per ton extra.

Sodium Sulphate (Glauber's Salt).—About £8 10s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot, £32 2s. 6d. per ton, d/d, in drums; broken, £33 2s. 6d. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £59 per ton; pea crystals, £37 12s. 6d. per ton d/d station in kegs; commercial, £23 7s. 6d. per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £20 to £22, according to fineness.

Sulphuric Acid.—Net, naked at works. 168° Tw. according to quality, per ton, £9 17s. 6d. to £11; 140° Tw., arsenic free, per ton, £7 17s. 6d.; 140° Tw., arsenious, per ton, £7 9s. 6d.

Tartaric Acid.—Per cwt.: 10 cwt. or more, £11 10s.

Titanium Oxide.—Standard grade comm., with rutile structure, £155 per ton; standard grade comm., £135 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d, white seal, £102; green seal, £100; red seal, £98.

Solvents and Plasticisers

Acetone.—Small lots: 5-gal. drums, £129 per ton; 10-gal. drums, £119 per ton. In 40/45-gal. drums less than 1 ton. £94 per ton; 1 to 9 tons, £91 per ton; 10 to 49 tons, £89 per ton; 50 tons and over, £88 per ton. All per ton d/d.

Butyl Acetate BSS.—£169 per ton, in 1-ton lots; £167 per ton, in 10-ton lots.

***n*-Butyl alcohol, BSS.**—10 tons, in drums, £154 per ton d/d.

***sec.*-Butyl Alcohol.**—5 gal. drums £159; 40 gal. drums: less than 1 ton £124 per ton; 1 to 10 tons £123 per ton; 10 tons and over £122 per ton; 100 tons and over £120 per ton.

***tert.*-Butyl Alcohol.**—5 gal. drums £195 10s. per ton; 40/45 gal. drums: less than 1 ton £175 10s. per ton; 1 to 5 tons £174 10s. per ton; 5 to 10 tons, £173 10s.; 10 tons and over £172 10s.

Diacetone Alcohol.—Small lots: 5 gal. drums, £177 per ton; 10 gal. drums, £167 per ton. In 40/45 gal. drums; less than 1 ton, £142 per ton; 1 to 9 tons, £141 per ton; 10 to 50 tons, £140 per ton; 50 to 100 tons, £139 per ton; 100 tons and over, £138 per ton.

Dibutyl Phthalate.—In drums, 10 tons, 2s. per lb. d/d; 45 gal. drums, 2s. ¾d. per lb. d/d.

Diethyl Phthalate.—In drums, 10 tons, 1s. 10¼d. per lb. d/d; 45 gal. drums, 1s. 11¾d. per lb. d/d.

Dimethyl Phthalate.—In drums, 10 tons, 1s. 7¼d. per lb. d/d; 45 gal. drums, 1s. 8¾d. per lb. d/d.

Dioctyl Phthalate.—In drums, 10 tons, 2s. 8d. per lb. d/d; 45 gal. drums, 2s. 9½d. per lb. d/d.

Ether BSS.—In 1 ton lots, 1s. 11d. per lb; drums extra.

Ethyl Acetate.—10 tons lots, d/d, £133 per ton.

Ethyl Alcohol (PBS 66 o.p.).—Over 300,000 p. gal., 2s. 9d.; 2,500-10,000 p. gal., 2s. 11½d. per p. gal., d/d in tankers. D/d in 40/45-gal. drums, 1d. p.p.g. extra. Absolute alcohol (75.2 o.p.) 5d. p.p.g. extra.

Methanol.—Pure synthetic, d/d, £43 15s. per ton.

Methylated Spirit.—Industrial 66° o.p.: 500 gal. and over in tankers, 4s. 10d. per gal. d/d; 100-499 gal. in drums, 5s. 2½d. per gal. d/d. Pyridinised 64 o.p.: 500 gal. and over in tankers, 5s. 0d. per gal. d/d; 100-499 gal. in drums, 5s. 4½d. per gal. d/d.

Methyl Ethyl Ketone.—10-ton lots, £141 per ton d/d

Methyl *iso*Butyl Ketone.—10 tons and over £162 per ton.

***iso*Propyl Acetate.**—In drums, 10 tons, £128 per ton d/d ; 45 gal. drums, £133 per ton d/d.

***iso*Propyl Alcohol.**—Small lots : 5 gal. drums, £118 per ton ; 10-gal. drums, £108 per ton ; in 40-45 gal. drums ; less than 1 ton, £83 per ton ; 1 to 9 tons £81 per ton ; 10 to 50 tons, £80 10s. per ton ; 50 tons and over, £80 per ton.

Rubber Chemicals

Carbon Bisulphide.—£61 to £67 per ton, according to quality.

Carbon Black.—8d. to 1s. per lb., according to packing.

Carbon Tetrachloride.—Ton lots, £76 10s. per ton.

India-rubber Substitutes.—White, 1s. 6¾d. to 1s. 10¼d. per lb. ; dark, 1s. 4½d. to 1s. 8d. per lb.

Lithopone.—30%, about £54 per ton.

Mineral Black.—£7 10s. to £10 per ton.

Sulphur Chloride.—British, about £50 per ton.

Vegetable Lamp Black.—£64 8s. per ton in 2-ton lots.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton, in 6-ton lots, d/d farmers' nearest station: December, £17 12s. 6d. ; January, £17 15s.

Compound Fertilisers.—Per ton in 6 ton lots, d/d farmer's nearest station, I.C.I. Special No. 1 £27 9s.

'Nitro-Chalk.'—£15 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots, d/d nearest station : December to February, £26 5s.

Coal-Tar Products

Benzole.—Per gal., minimum of 200 gals. delivered in bulk, 90's, 5s. ; pure, 5s. 4d.

Carbolic Acid.—Crystals, 1s. 4d. to 1s. 6¼d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 4½d. to 1s. 6¼d. per lb., d/d crude, 8s. naked, at works.

Creosote.—Home trade, 1s. to 1s. 4d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 1s. to 1s. 8d. per gal.

Cresylic Acid.—Pale 99/100%, 5s. 9d. per gal. ; 99.5/100%, 6s. per gal. D/d UK in bulk ; Pale A.D.F., from 5s. 6d. per Imperial gallon, f.o.b.

Naphtha.—Solvent, 90/160°, 5s. per gal. for 1000-gal. lots ; heavy, 90/190°, 3s. 9½d. per gal. for 1000-gal. lots, d/d. Drums extra ; higher prices for smaller lots.

Naphthalene.—Crude, 4-ton lots, in sellers' bags £15 to £22 per ton nominal, according to m.p. ; hot pressed, £40 per ton in bulk ex-works ; purfied crystals, £58 per ton d/d.

Pitch.—Medium, soft, home trade, £8 10s. per ton f.o.r. suppliers' works ; export trade about £10 10s. per ton f.o.b. suppliers' port.

Pyridine.—90/160°, £1 15s. to £2 per gal.

Toluole.—Pure, 5s. 7d. ; 90's, 4s. 10d. per gal. d/d. MANCHESTER : Pure, 5s. 7d. per gal. naked.

Xylole.—For 1000-gal. lots, 5s. 10d. to 6s. per gal., according to grade, d/d London area.

Intermediates and Dyes (Prices Nominal)

***m*-Cresol** 98/100%.—4s. 3d. per lb. d/d.

***o*-Cresol** 30/31° C.—1s. 4d. per lb. d/d.

***p*-Cresol** 34/35° C.—4s. 3d. per lb. d/d.

Dichloraniline.—3s. 6d. per lb.

Dinitrobenzene.—88/89°C., 1s. 11d. per lb.

Dinitrotoluene.—S.P. 15° C., 1s. 11½d. per lb. ; S.P. 26° C., 1s. 3d. per lb. S.P. 33°C., 1s. 1½d. per lb. ; S.P. 66/68°C., 1s. 9d. per lb.

***p*-Nitraniline.**—4s. 7d. per lb.

Nitrobenzene.—Spot, 9½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—2s. per lb.

***o*-Toluidine.**—1s. 9d. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—5s. 6d. per lb., in casks.

Dimethylaniline.—3s. 1d. per lb., drums extra, carriage paid.

Chemical & Allied Stocks & Shares

A LARGE business has continued to be transacted in stock markets, but the emphasis remained on industrial shares. This has been due partly to many financial results showing further increases in earnings and dividends. Another factor drawing attention to industrial shares has been the assumption that, if inflation developed, ordinary or equity shares would tend to advance in price, whereas fixed-interest stocks would move lower. British Funds have declined in price in the past few weeks because of continued talk of a possible increase in the bank rate. There are different views on this; but it is generally believed that the bank rate will not be raised unless the authorities think it necessary as a check to inflation trends.

There has been considerable activity in chemical and allied shares, and although best levels were not held, many gains have been recorded as compared with a month ago. Imperial Chemical were prominent, as usual, and have risen on balance from 41s. 10½d. to the new high record of 45s. 1½d. It is being assumed that the financial results are likely to show earnings of the group at a fresh peak level, and there is now a general disposition to look for a 10 per cent dividend on the larger capital.

Rises General

Compared with a month ago, Fisons have strengthened further from 58s. 1½d. to 59s., while Monsanto 5s. shares in active dealings advanced on the month from 30s. 6d. to 33s. 9d. Reichhold 5s. shares have risen to the new peak level of 18s. 4½d.; a month ago they were 15s. 3d. Hickson & Welch 10s. shares advanced to 20s. under the influence of the financial results and the raising of the dividend from 8½ per cent to 11 per cent. Earnings on the shares were equal to more than 40 per cent. Lawes Chemical at 15s. 10½d. eased a few pence. British Glues & Chemicals 4s. shares were active, but at 14s. xd. have not quite held best levels.

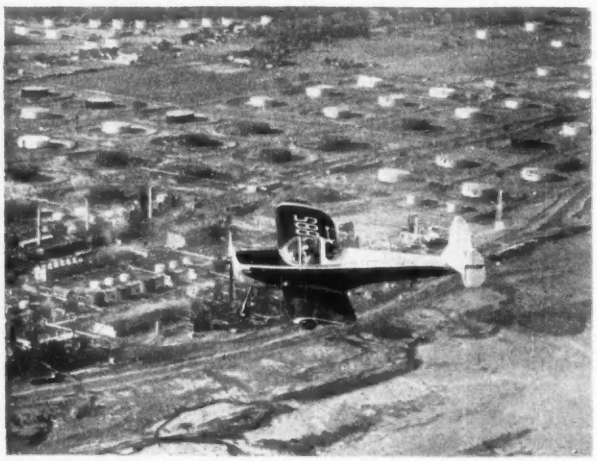
Albright & Wilson 5s. shares advanced to the new peak level of 31s. 6d. on hopes of prospects of a higher dividend or a free scrip issue. A month ago the price was 26s. 9d. Business in British Chrome & Chemicals 5s. shares has been around 14s. A month ago the quotation was 12s. 6d. Hickson Lloyd 10s. shares were 14s. 9d. Yorkshire Dyeware 5s. shares at 10s. 9d. have not kept best levels. Coalite & Chemical 2s. units moved up to 4s. 3d.

British Industrial Plastics 2s. shares were up to 6s. xd. under the influence of the higher dividend. Shares of other plastics companies were active, particularly British Xylonite, which, however, have not maintained best levels at 43s. 9d. Bakelite 10s. shares were 28s. 9d. and Kleemann 1s. shares 14s. British Oxygen have risen sharply to 68s. 9d. partly because of the scope for expansion in business indicated by the demand for plants for the mass production of oxygen at factory sites, and partly because of news of the company's interests in plastics.

Borax Activity

There was again a great deal of activity in Borax Consolidated up to 110s. 3d. but later the price came back to 101s. 3d., which, however, compares with 92s. a month ago. Latest developments indicate that control by US interests is now very unlikely. On the other hand, the increased dividend foreshadowed by the directors, coupled with their indication of the scope for expansion in the company's business and the fact that its assets are much undervalued in the accounts, suggests that, on a long term view, the shares may be worth well over their current higher price.

Elsewhere, Greeff-Chemicals Holdings 5s. shares have gained 1s. at 14s. 7½d. Boots drug 5s. shares have advanced to the new peak of 32s., which compares with 26s. 9d. a month ago, higher dividend hopes attracting buyers. In active dealings Unilever moved up to 86s., but have since reflected profit-taking and come back to 79s. 3d. Triplex Glass 10s. shares strengthened from 36s. 3d. to 37s. and United Glass Bottle were 80s. 3d. on the scrip issue news. Staveley, after reaching the new high level of 65s, lost part of the rise, easing to 62s. 9d. The 4s. units of the Distillers Co. remained an active feature around 28s. 6d. William Blythe 3s. shares were again prominently active, but compared with a month ago, have come back from 21s. 3d. to 18s. 6d. Oil shares after reaching peak levels lost some ground. Shell were 128s. 9d. after 130s. and BP 83s. 9d. after 88s. 4½d.



The Sealol-Flexibox service aircraft flying over an oil refinery in the Central-Western area of the United States

Flying Seals

THE Sealol-Flexibox organisation in the United States has for some months been delivering and fitting urgently needed mechanical seals within a maximum of five hours of receiving the plant engineer's telephone call. This includes service to out-of-the-way oil refineries and chemical plants more than 400 miles from the organisation's regional headquarters at Tulsa, Oklahoma.

The service has been made possible by the purchase of an 85 HP two-seater Ercoupe aircraft specially for the purpose. In the first four months of its use the plane has flown 10,000 miles in 87 airborne hours. A typical flight is from Tulsa to St. Louis, Missouri, which takes 3½ hours, clipping 6½ hours from the time taken by road.

In addition to providing factory-trained knowledge and service to customers throughout an area of 225,000 square miles covering five states, the aircraft is used to keep in almost daily touch with Sealol-Flexibox distributors.

Joint Effort

The organisation is a joint effort of two leading mechanical seal manufacturers, Flexibox Ltd., of Manchester, England, and the Sealol Corporation of Providence, Rhode Island. In 1953 these two companies signed agreements whereby Flexibox seals would be manufactured and sold in the USA and Canada by Sealol and Sealol seals would be similarly handled by Flexibox in the British Empire and most European countries.

German Process for UK

BY arrangement with the German firm, Mahle - KG, Sheepbridge Engineering Ltd. have secured the sole UK manufacturing and selling rights for chrome plating light alloy engine cylinders and similar components by a special process. The process will be operated by British van der Horst Ltd., a subsidiary of Sheepbridge Engineering Ltd., and the selling rights secured under the agreement will be administered by Sheepbridge Stokes Ltd. The process makes it possible to deposit hard chromium directly on to aluminium alloys.

By this new agreement British manufacturers will be able to specify light alloy cylinders from chrome plated bores in their engine designs. The success of the new process has opened up an entirely new field in the design of light alloy cylinder barrels and similar components in which lightness, wear resistance and rapid heat dissipation are required.

Up to now, aluminium cylinders have had to be fitted with cast iron or steel liners. The use of chromium plated aluminium cylinders avoids a big difference in thermal expansion between piston and cylinder, provides an excellent wear-resisting surface and one which is far more resistant to corrosion.

Of major technical importance is the fact that with a chrome plated cylinder block the piston assembly may be fitted with much closer working tolerances than are possible in the cast iron sleeved engine, enabling greatly increased efficiency to be obtained.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

MANIPLASTICS PRODUCTS LTD., London S.E.—16 December, debenture, to J. R. Gillum, London, securing all moneys and liabilities due or to become due from the company to the holder; general charge.

Increases in Capital

The following increases in capital have been announced:—DORMAN LONG (CHEMICALS) LTD., from £100,000 to £950,000; DORMAN LONG (BRIDGE & ENGINEERING) LTD., from £100,000 to £850,000; DORMAN LONG (STEEL) LTD., from £100,000 to £23,250,000; ASHE CHEMICAL LTD., from £200,000 to £300,000; CIMEX-FRASER TUSON LTD., from £32,500 to £40,000; ARNOLD GRIMSHAW LTD., from £5,300 to £30,000; PAUL V. KUTIAK & CO. LTD., from £100 to £10,000.

Company News

Monsanto Chemical Company

Net income of the US Monsanto Chemical Company and its domestic and Canadian subsidiaries for 1954 was $23,700,510 (unaudited). Unaudited sales amounted to $341,822,557, an increase of 0.7 per cent over the 1953 figure. An executive of the company has forecast a 14 per cent increase in plastics consumption in the USA during 1955.

The United Steel Companies Limited

Balance of profit of The United Steel Companies Ltd. for the year ended 30 September, 1954, was £9,136,496, compared with £9,111,141 for the previous year. After deductions for taxation, etc., the net surplus for appropriation was £3,253,372. A final dividend of 6 per cent on the ordinary shares, making 10 per cent for the year, is recommended. In the directors' report it is stated that production has been maintained at a high level at all the works and the output of each of the basic products—steel ingots, iron and coke—was the highest in the company's history.

Weinreb & Randall Ltd.

The business formerly carried on by F. Weinreb & Co. Ltd. has been taken over by a new company, Weinreb & Randall Ltd. at the same address, 70 New Oxford Street, London W.C.1. While continuing to supply Raschig rings, berl saddles and other packings for distillation and similar processes, the firm is extending the range to include Pall rings and other new designs not previously available in this country. The company is controlled by Mr. D. G. Randall, a chemical engineer of wide experience, specialising in distillation, and Mr. F. Weinreb is consultant.

Hickson & Welch (Holdings) Limited

The directors of Hickson & Welch (Holdings) Ltd. are recommending a final dividend on the ordinary shares of 7½ per cent for the year ended 30 September, 1954, making with the interim dividend already paid a total of 11 per cent. This compares with a total payment of 8½ per cent for the previous year. Group net profit after tax was £121,879 (£57,961). The directors announce that they have decided, subject to Treasury consent, to increase the ordinary share capital of the company by issuing for cash 300,000 additional ordinary shares of 10s. each. The shares will be offered to ordinary shareholders by way of rights on attractive terms.

British Benzol & Coal Distillation Ltd.

At the annual general meeting of British Benzol & Coal Distillation Ltd. on 18 January, the recommended final dividend of 12½ per cent, less income tax, was approved. This makes a total payment of 17½ per cent for the year.

Next Week's Events

TUESDAY 1 FEBRUARY

Chemical Society

Edinburgh: North British Station Hotel, 7 p.m. 'The Formation of Tyrosine Melanin' by Professor G. R. Clemo.

Society of Chemical Industry

London: Chemical Society's Rooms, Burlington House, Piccadilly, 6.30 p.m. Joint meeting of London Section and Plastics and Polymer Group. 'Surface Chemistry and Adhesion' by Dr. W. C. Wake.

Society for Visiting Scientists Limited

London: 5 Old Burlington Street W.1, 7.30 p.m. Discussion meeting on 'Colour from the Viewpoint of the Painter and the Scientist.'

WEDNESDAY 2 FEBRUARY

Royal Institute of Chemistry

Walthamstow: South-West Essex Technical College, Forest Road E.17, 7 p.m. 'Some Chemical Aspects of Forensic Science' by L. C. Nickolls.

Society for Analytical Chemistry

London: Lecture Theatre, Royal Institution, 21 Albemarle Street W.1, 6 p.m. 'The Complexones and their Analytical Application' by Professor G. Schwarzenbach.

THURSDAY 3 FEBRUARY

Royal Institute of Chemistry

Leeds: Chemistry Lecture Theatre, The University, 6.30 p.m. 'Man-Made Fibres' by Professor C. S. Whewell (joint meeting with SCI).

Stockport: College for Further Education, 7.30 p.m. 'Chemotherapy' by Dr. F. L. Rose.

Chemical Society

London: Society's Rooms, Burlington House, Piccadilly, 7.30 p.m. Meeting for the reading of original papers.

Institute of Fuel

Liverpool: East Lancashire Road, Kirkby, 2.30 p.m. Visit to I.C.I. works.

Derby: Electricity Showrooms, 7.15 p.m. 'Methane Production' by Dr. F. J. Dent.

Royal Society

London: Burlington House, Piccadilly, 4.30 p.m. 'The Thermal Conductivity of Metals at Low Temperatures' by H. M. Rosenberg and 'Absorption Co-efficients in the Vacuum Ultra-Violet—Part III—Methane' by R. W. Ditchburn.

FRIDAY 4 FEBRUARY

Royal Institute of Chemistry

Brighton: Technical College, 7 p.m. 'The Use of Photography in Scientific and Engineering Investigations' by Dr. R. H. Herz (with Brighton Technical College Chemical Society).

Chemical Society

Birmingham: Chemistry Department, The University, 4.30 p.m. 'Some Recent Applications of the Study of Photochemistry to the Study of Reactions' by Professor R. G. W. Norrish.

Southampton: Chemistry Department, The University, 5 p.m. 'Recent Investigations in the Field of Vinyl Polymerisation' by Dr. C. H. Bamford.

Swansea: Chemistry Department, University College, 5.30 p.m. 'The Adsorption of Vapours by Solids' by Professor D. H. Everett.

Society of Chemical Industry

Manchester: Engineers' Club, Albert Square, 6.30 p.m. 'Some Aspects of Air Conditioning in the Bakery and Textile Industries' by Dr. D. W. Hill and E. A. Farrand (joint meeting of Food Group and Manchester Section).

Institute of Fuel

Cardiff: South Wales Institute of Engineers, Park Place, 6 p.m. 'Smoke Abatement' by Dr. A. C. Monkhouse.

Apprentices Rewarded

A WARNING against the dangers of over-specialisation was given by Mr. D. Williams, Director of the Pendley Residential Centre of Adult Education, in the course of a speech at the annual Apprentice Prize Giving of George Kent Ltd. held at Luton on 10 January. Mr. Williams said that he thought we were living in an age of talk and expressed the opinion that more attention should be paid to the need for action.

Presenting the prizes, Commander P. W. Kent, R.N. (Retd.), chairman and managing director of the firm, said it had been a highly satisfactory training year, there being 132 apprentices in the firm's scheme. He presented The Commander Kent Challenge Cup to E. F. Snare, The Sir Walter Kent Prize to D. Thirkell, The R. W. Bedford Challenge Cup to J. C. Keeling, and The Grout Prize to I. R. Jepps.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

A. BOAKE, ROBERTS & CO., LTD., CARPENTERS ROAD, LONDON, E.15, require the services of **SHIFT CHEMISTS** for Plant Control work. Academic qualifications will be an advantage, but are less essential than industrial plant experience. The work is interesting and varied, and the appointments will be progressive. There is every opportunity for advancement. Initial salary will be in the range of £600 to £700 per annum.

Applications plainly marked "Shift Chemists," to **PERSONNEL MANAGER.**

A. BOAKE, ROBERTS & CO., LTD., LONDON, E.15, require **SENIOR CHEMISTS** for their Process Development Department. These appointments would appeal to qualified men with some years of experience of Organic Chemistry, seeking the opportunity to lead a team in developing new projects from laboratory to plant scale, so as to provide new or improved products. The minimum salary envisaged is £800 per annum.

The company also requires **ASSISTANT CHEMISTS** to participate in these projects. Industrial chemical experience is desirable in these appointments. Minimum salary is £550 per annum. Applications in detail to **PERSONNEL MANAGER.**

ASSISTANT PETROLEUM ENGINEER required by **KUWAIT OIL COMPANY** for service in Kuwait. Applicants must possess a Degree in Petroleum, Chemical or Mechanical Engineering, Petroleum Technology, Geology, Physics, Chemistry or Mathematics. Some previous oilfield experience an advantage. Age 23-30. Salary starting not less than £790 per annum clear, plus generous allowances, Pension Scheme and kit allowance. Write for application form, giving brief details and quoting K.1819 to Box D/99, c/o 191, Gresham House, E.C.2.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ALDERMASTON, BERKS, requies a **CHEMICAL ENGINEER** in the grade of a **SENIOR EXPERIMENTAL OFFICER** or **EXPERIMENTAL OFFICER,** for development and design work on new chemical plants. Minimum qualifications are Inter B.Sc. or Higher National Certificate in Chemistry, Chemical Engineering or Mechanical Engineering, but Chemical Engineering qualifications to degree standard would be preferred. Applicants for a S.E.O. post should have had several years' appropriate experience and be able to make design calculations with also a good knowledge of constructional materials and of engineering detail.

The salary ranges are: Senior Experimental Officer (minimum age normally 35), £1,017-£1,197 (male) per annum. Experimental Officer (minimum age 26), £715-£880 (male) per annum. The successful applicant will be required to join the Authority's Principal Superannuation Scheme to be introduced shortly, and the salary scales quoted will be enhanced to cover contributions. Housing will be available within a reasonable period for married officers who live outside the Establishment's transport facilities. During this period, lodging allowance may be payable to suitably qualified candidates. Application form from Senior Recruitment Officer, A.W.R.E., Aldermaston, Berks. Quote Ref. A.19/WGE/38.

SITUATIONS VACANT

BRITISH ELECTRICITY AUTHORITY
SOUTHERN DIVISION

APPLICATIONS are invited for the following post:—

ASSISTANT CHEMIST,
DIVISIONAL HEADQUARTERS, PORTSMOUTH.

Applicants should preferably have had some practical experience in the analysis of either coal, oil, or water, and general analytical work. Experience will be gained in work associated with atmospheric and river pollution, and the prospects for promotion are good. Candidates should have reached Intermediate B.Sc. standard or its equivalent, and the successful candidate will be given every encouragement to qualify.

Salary range, £475 to £590, according to experience.

Special application forms obtainable from P. D. A. Oliver, Divisional Secretary, British Electricity House, High Street, Portsmouth, should be returned by February 14th. Please quote reference C.A.

CHIEF CHEMICAL ENGINEER

LAPORTE CHEMICALS LIMITED invite applications for the post of **CHIEF CHEMICAL ENGINEER** of the Laporte Group of Companies, involving responsibility for chemical engineering and pilot plant development over a wide range of processes and products. Applicants should have an Honours degree or equivalent in Engineering, preferably Chemical Engineering, and wide experience of chemical industry and processes. They should be accustomed to the preparation of process flow sheets and preliminary estimates of capital, operation and process costs. Candidates should reply to the Engineering and Production Director, Laporte Chemicals Limited, 14, Hanover Square, W.1., and should give full details of education and experience and positions held.

INDUSTRIAL CHEMIST required by leading Container Closure Manufacturers in Midlands. Progressive position requiring knowledge metal printing, varnishing, stoving and metallurgy, associated with food packaging industry. Maximum age, 35 years. Written applications with details of experience, previous appointments, etc., to **A.G.M. METAL CLOSURES, LTD., BROMFORD LANE, WEST BROMWICH, STAFFS.**

MINISTRY OF SUPPLY requires **CHEMIST** or **PHYSICIST** at Research Establishment near Bridgend, Glamorgan, for experimental work on the chemical and physical properties and the measurement of performance characteristics of pyrotechnic systems. Quals.—Higher School Certificate (Science) or equivalent, but possession of a H.N.C. or a degree in Chemistry or Physics may be an advantage. Some knowledge of electronic equipment desirable. The post may be transferred to Horsham, Sussex, within next two years. Salary within Experimental Officer range (min. age 26) £715-£880. Women somewhat less. Application forms from M.L.N.S., Technical and Scientific Register (K), Almack House, 26, King Street, London, S.W.1., quoting F.18/5A. Closing date 19th February 1955.

PHYSICAL CHEMIST (or Physicist, with knowledge of Analytical methods) to take charge of Works Control Laboratory in Hertfordshire; Graduate preferred. Initial salary approximately £1,000 per annum (according to qualifications for post). Excellent prospects. Pension and Profits Participation Schemes. Write full details, age, qualifications, experience to date, to **REF. P.C., BOX No. 8282, c/o CHARLES BARKER & SONS, LTD., 31, BUDGE ROW, LONDON, E.C.4.**

SITUATIONS VACANT

SENIOR CHEMIST required, with a knowledge of Synthetic Resins and Rubber Technology to take charge of a specialised Laboratory. Candidates must have had at least four years' Technology experience in chemical control and analysis in a senior capacity. Some experience in this field an advantage. Age 25-40, with Degree or Technological qualification. The laboratory, which is shortly to be opened, will be in pleasant surroundings in the Reading area. **BOX No. C.A. 3382, THE CHEMICAL AGE, 154, FLEET STREET, LONDON E.C.4.**

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ALDERMASTON, BERKS. requires **ASSISTANT EXPERIMENTAL OFFICERS** to work in an Industrial Chemistry Laboratory engaged on a variety of chemical services to the Establishment, including the testing of industrial and sewage wastes, control of chemical processes, metallurgical analyses, etc. The minimum qualification is Higher School Certificate or equivalent, but a Degree or Higher National Certificate in Chemistry would be an advantage. Some experience of general chemical analysis is desirable. The salary scale is £288 10s. (at age 18) to £640 (male) per annum. The successful applicants will be required to join the Authority's Principal Superannuation Scheme to be introduced shortly, and the salary scales quoted will be enhanced to cover contributions. Housing will be available within a reasonable period for married officers who live outside the Establishment's transport facilities. During this period, lodging allowance may be payable to suitably qualified candidates. Application form from Senior Recruitment Officer, A.W.R.E., Aldermaston, Berks. Quote Ref. 296/WGE/38.

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